TimePlex Group

LINK/2+®

Integrated Connectivity Systems User's Guide

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NOTICE

Telecommunications products must be installed and operated in compliance with the relevant National Regulatory requirements summarized in the **REGULATORY** section of User’s Guide. READ IN FULL, PRIOR TO INSTALLATION, any product-specific National Regulatory requirements applicable to the country of installation.

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WARNING

NO OPERATOR SERVICEABLE PARTS ARE INSIDE THIS EQUIPMENT. SERVICE MUST BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.

VORSICHT

NICHT VOM BENUTZER REPARIERPARE TEILE IM GEHÄUSE. BITTE WENDEN SIE SICH AN QUALIFIZIERTES WARTUNGSPERSONAL.

ATTENTION

CET APPAREIL NE CONTIENT AUCUN ELÉMENT QUE L'UTILISATEUR PUISSE RÉPARER. CONFIER LA MAINTENANCE À UN PERSONNEL TECHNIQUE QUALIFIÉ.

MODELS COVERED BY THIS MANUAL

This manual applies to the microLINK/2+™ (6-slot Mainframe), miniLINK/2+™ (13-slot Mainframe), and LINK/2+® (18-slot Mainframe) Integrated Connectivity Systems with the following software versions:

Module		Boot PROM Number	Software Number
Network	NCL	RP48101C	RP50012J
Interlink	ILC	—	RP50013E
Integrated Trunk	ILQ	RP47780B	RP50003B, RP50004B
X.50 Server	XSM	RP48117A	RP48120A
Voice Server	VSM.3	RP48142A	RP48141A
Voice Server	VSM.5	RP48197A	RP48198A
NOTE: The suffix revision letters on the boot PROM and software numbers listed in this table may not agree with the current suffix revision letters.			

NOTES: *In this manual, the term **LINK/2+ System** is used to represent all models unless specific reference to a particular Mainframe type is needed.*

In this manual, a module name is used generically to represent all models of that module, e.g., Quad Asynchronous Module includes QAM, QAM.1, QAM.2, QAM.3, and QAM.6. A model designation, e.g., QAM.1, is generally used to refer to a specific model or interface.

HOW TO USE THIS MANUAL

This manual is part of a three-volume set which also includes the LINK/2+ Configuration Planning Manual and LINK/2+ Installation and Maintenance Manual. Other related publications include:

- LINK/2+ Bipolar Framing Module (BFM) User's Manual, MC15486
- LINK/2+ Bipolar Interface Module (BIM.8, BIM.9) User's Manual, MC15237

The LINK/2+ System must be installed by qualified service personnel and be functioning properly before a user can begin operation.

☐ Program the LINK/2+ System using worksheets filled out in accordance with the LINK/2+ Configuration Planning Manual. Refer to Chapter 6, Configuration Commands, for configuration guidelines, typical configuration procedures, and configuration command descriptions.

☐ Operate the LINK/2+ System using supervisory port commands described in the Commands section of this manual:

- To monitor system status and alarms, see Chapter 5, Display Commands.

- To connect/disconnect channels, change parameters, and perform other configuration activities, see Chapter 6, Configuration Commands. For detailed information on any parameter, see the LINK/2+ Configuration Planning Manual. If changes to DIP switch settings are needed, see the LINK/2+ Installation and Maintenance Manual.

- To perform diagnostic tests, see Chapter 7, Diagnostic Commands.

Users should also familiarize themselves with the Introduction section of this manual before operating the LINK/2+ System.

☐ Isolate faults and perform corrective maintenance on the LINK/2+ System according to information given in the LINK/2+ Installation and Maintenance Manual.

NOTE: *The Installation and Maintenance Manual is for use by qualified service personnel only.*

ORGANIZATION OF THIS MANUAL

This manual describes how to operate your LINK/2+ System. The information is organized as follows.

Introduction (Chapters 1 and 2)

This section provides information that a user should be familiar with before using the LINK/2+ System.

- **Chapter 1, Product Description,** describes the key features of the LINK/2+ System, provides a functional description of the system and its modules, and gives system specifications.

- **Chapter 2, Getting Started,** presents information a user needs to start using the LINK/2+ System, such as power application and turn-off, self-test and other start-up activities, and supervisory port log in and log out. This chapter also includes procedures for loading operational software and database backup.

Commands (Chapters 3 through 7)

This section explains how to operate the LINK/2+ System using supervisory port commands.

- **Chapter 3, General Information,** explains the command format and provides operational guidelines.

- **Chapter 4, Support Commands,** discusses supervisory port operational commands and command files.

- **Chapter 5, Display Commands,** describes the commands that provide status, statistical, and configuration information.

- **Chapter 6, Configuration Commands,** describes the commands used to configure the LINK/2+ System. This chapter also includes guidelines for performing configuration activities and typical configuration procedures.

- **Chapter 7, Diagnostic Commands,** describes the commands that allow the user to test channels, intermachine links, modules, and alarm relays.

Appendixes

Appendix A provides error and status messages.

SERVICE

For service in the U.S., contact Customer Support at 1-800-237-6670.

For service outside the U.S., contact your local sales representative.

Information required for service is:

Model No: _____ Serial No: _____

WARNINGS, PRECAUTIONS, AND NOTES

Be sure that you understand all directions, warnings, and limitations before using this product. In this manual:

- WARNINGS present information or describe conditions which if not observed could result in injury.

- PRECAUTIONS reflect conditions which could cause product damage or data loss.

- NOTES describe limitations on the use of the equipment or procedure.

IF PRODUCT IS RECEIVED DAMAGED

Forward an immediate request to the delivering carrier to perform an inspection and prepare a damage report. SAVE container and packing material until contents are verified.

Concurrently, report the nature and extent of damage to Customer Support so that action can be initiated to repair or replace damaged items or instructions issued for returning items.

The responsibility of the manufacturer ends with delivery to the first carrier. ALL CLAIMS for loss, damage, or nondelivery must be made against the delivering carrier WITHIN 10 DAYS OF RECEIPT of shipment.

TO RETURN PRODUCT

Please obtain instructions from Customer Support before returning any item(s). Report the fault or deficiency along with the model, type, and serial number of the item(s) to Customer Support. Upon receipt of this information, Customer Support will provide service instructions or a Return Authorization Number and other shipping information. All items returned under this warranty must be sent to the manufacturer with charges prepaid.

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Chapter 1

Product Description

LINK/2+ Integrated Connectivity Systems are the building blocks of high capacity wide area networks for voice-data-image communications. In private, public, and hybrid networking applications, LINK/2+ Systems form powerful digital networks characterized by bandwidth efficiency, integrated communications, and full network management capabilities.

In private networks, LINK/2+ Systems use an optimized protocol that integrates network traffic and provides an error protected channel for control and supervisory information. In hybrid networks, LINK/2+ Systems connect to public facilities at the DS-1 and higher levels. For DS-1 applications, LINK/2+ Systems use standard D4/G.732/TTC formatting to take advantage of the full voice and data services offered by common carriers. For applications using NTT High-Speed Digital Leased Circuit Services, LINK/2+ Systems use JT-2 framing for trunk speeds up to 6.312 Mbps. LINK/2+ Systems also give users convenient access to fractional T-1 and switched 56 kbps services.

Networks of LINK/2+ Systems can accommodate up to 2000 nodes. This high number of nodes, full gateway capabilities, and intermachine link speeds ranging from 4.8 kbps to 2.048 Mbps give LINK/2+ networks outstanding flexibility to connect multiple sites with widely varying requirements throughout the world.

The design of LINK/2+ Systems ensures minimal interruption of critical communication facilities. Redundant system control elements are available on all LINK/2+ models. After a communication facility failure, automatic alternate routing reconnects critical circuits according to programmable priorities. System options enable backup or expansion of circuit bandwidth using dial-up networks. These capabilities allow network design to be based on average rather than peak loads.

Optional microcontroller-based digital phase locked loop (PLL) circuitry on LINK/2+ Systems, with on-board Stratum 3 accurate oscillator and clock qualifier monitor circuit, ensures detection of faulty clock reference as well as smooth network operation during subsequent clock switchover. The PLL option enhances network reliability and offers greater operational flexibility.

The LINK/2+ System incorporates a modular design for flexibility and superior performance. See the "Functional Description" paragraphs for a description of each module.

APPLICATIONS

LINK/2+ Systems form the basis for powerful and efficient private and hybrid networks and also give common carriers an economical means of providing channelized services with high reliability, supported by comprehensive diagnostics. Figure 1-1 indicates the range of voice-data-image inputs to a LINK/2+ System along with different types of network connections. A LINK/2+ network can integrate a wide variety of inputs into a cost-effective and efficient solution to a full range of communications problems.

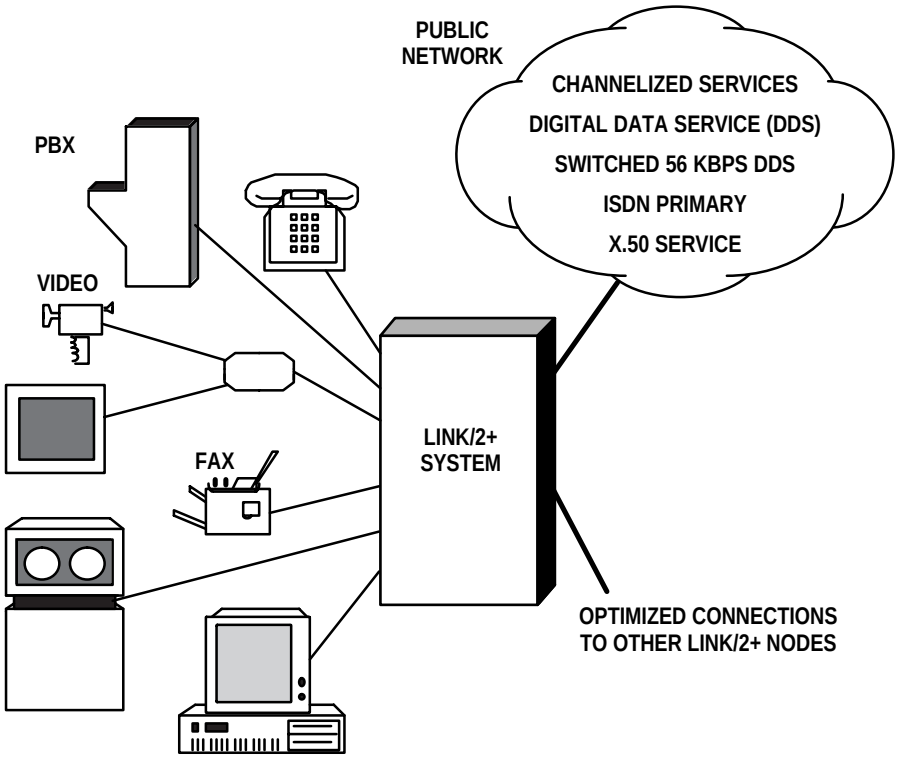


Figure 1-1. LINK/2+ System Connections

PRODUCT FEATURES

LINK/2+ Systems deliver full integration of voice, data, and image transmission over T-1/E-1 facilities (1.544 to 2.048 Mbps), NTT High-Speed Digital Leased Circuit Services (6.312 Mbps), and lower speed facilities as well (from 4.8 kbps). Fractional T-1/E-1/NTT services are also supported. LINK/2+ Systems offer automatic alternate routing and other management capabilities for full and fractional connections through an embedded ARQ control channel. In addition, asymmetrical and simplex transmission facilities are supported for those applications where transmit and receive speeds differ for individual channels.

LINK/2+ System features include:

- Node capacity to as many as 2000 nodes
- Advanced Bandwidth Management (ABM) for network efficiency
- Extensive system security
- Redundant operation to ensure high reliability

Node Capacity

LINK/2+ networks can directly address up to 2000 nodes. The TIME/VIEW 2000 Network Management System establishes all routing tables and channel connections. Supervisory port commands are also available for establishing internetwork connections.

Advanced Bandwidth Management (ABM)

The LINK/2+ System provides the following ABM features:

- Selective routing
- Grooming
- Bumping
- ILP bandwidth contention and pooling

Selective Routing

Selective routing is the process by which routing decisions are made according to the specific path criteria defined in a channel's ABM profile. This feature is supported for channels that pass through transfer nodes. At connection time, the Network Module will test a possible outbound intermachine link to determine if it meets a channel's ABM profile requirements. Any intermachine link failing to meet these requirements is rejected and the next link in the routing table will be considered. This process continues until a suitable intermachine link is found and the connection is made, or until all possible outbound links have been rejected and an appropriate disconnect reason is assigned. The user has the ability to override selective routing path criteria.

For information on defining a channel's ABM profile, see Advanced Bandwidth Management Profile Parameters chapter in the LINK/2+ Configuration Planning Manual. For information on routing, see Routing chapter in the LINK/2+ Configuration Planning Manual.

Grooming

Grooming is the process of disconnecting and reconnecting channels at a time of minimal usage with the intention of obtaining a more desirable route. The system maintains two user-specified timetables that represent the grooming disconnect time and grooming reconnect time for each day of the week. These timetables are checked against the actual time at least once every 60 seconds. Provided that the system grooming parameter is enabled and the grooming disconnect time has been reached, the system searches for the first channel with grooming enabled in its ABM profile which meets certain qualifications. Any channel that does not have grooming enabled in its ABM profile or does not meet the required conditions remains connected. Any channel(s) disconnected for grooming will be reconnected when the grooming reconnect time has been reached.

Dial-up services backup intermachine links will be disconnected at grooming disconnect time if and only if the primary intermachine link has been restored to in-service status. Once disconnected, dial-up services backup intermachine links are not reconnected at grooming reconnect time. Another feature, automatic grooming, provides grooming of switched backup bindles every 10 minutes. This feature will disconnect the backup bundle when the primary bundle is stable for 10 minutes and no connections are present on the backup bundle.

Grooming of channels that pass through transfer nodes is supported with certain restrictions listed in the System Parameters chapter in the LINK/2+ Configuration Planning Manual.

For information on enabling grooming in a channel's ABM profile, see Advanced Bandwidth Management Profile Parameters chapter in the LINK/2+ Configuration Planning Manual. For information on system grooming and specifying grooming disconnect and reconnect times, see System Parameters chapter in the LINK/2+ Configuration Planning Manual.

Bumping

Bumping is the process that will selectively disconnect (bump) one or more lower level channels, thereby allowing a higher level channel to connect. The higher level channel connects using the resources previously allocated to the lower level channel(s). A channel is assigned this bumping level in its ABM profile.

The bumping process utilizes two schemes: end-to-end and point-to-point. The end-to-end scheme attempts to locate a single channel that, when bumped, will provide enough bandwidth for the bumper to reach its destination node. The point-to-point scheme searches for one or more channels that, when bumped as a group, will satisfy the bumper's bandwidth requirements to the next node.

For information on assigning bumping levels, see Advanced Bandwidth Management Profile Parameters chapter in the LINK/2+ Configuration Planning Manual. To enable system bumping and select the bumping scheme, see System Parameters chapter in the LINK/2+ Configuration Planning Manual.

ILP Bandwidth Contention and Pooling

The ILP bandwidth contention feature enables the user to designate ILP DS-0 channels as bandwidth contention channels.

For information on designating ILP bandwidth contention channels, see Digital Voice and Channelized Services Parameters chapter in the LINK/2+ Configuration Planning Manual. For information on enabling ILP bandwidth contention and bandwidth pooling on a system level, see System Parameters chapter in the LINK/2+ Configuration Planning Manual.

System Security Features

The LINK/2+ System provides the following features for security:

- Password protection
- Gateway and nongateway designation
- Nodal security
- Intermachine link security

Password Protection

Password protection ensures that unauthorized users do not have access to the LINK/2+ System via the supervisory terminal. Two levels of password protection correspond to the gateway and nongateway commands discussed in the following paragraphs. If the supervisory port is designated as a gateway, users with password 2 can enter gateway and nongateway commands, while users with password 1 can enter nongateway commands only.

For information on defining passwords, see Chapter 4, Support Commands.

Gateway and Nongateway Designation

The gateway status of the supervisory port determines the types of commands that can be issued from the node. Gateway status also affects the supervisory computer port, for example, when an element management system is used. Designating the supervisory port or supervisory computer port as a gateway enables a device connected to the port to issue gateway commands to the local node and to remote nodes.

Gateway commands affect node operation, for example, configuration and diagnostic commands. Gateway commands are divided into two groups:

- **Global gateway commands** are accepted by the local node and all remote nodes within the same network if the supervisory port or supervisory computer port originating the commands is designated a gateway. Global gateway commands are typically used for diagnostics. Global gateway commands are noted by a **G** in the "G" column of the command summary tables throughout this manual.

- **Nonglobal gateway commands** are accepted by a **local** node if the supervisory port or supervisory computer port is designated a gateway.

  Nonglobal gateway commands are accepted by a **remote** node in the same network if:

  - The supervisory port or supervisory computer port originating the command is designated a gateway.

  - The node number of the node originating the command is on the alarm notification list of the node receiving the command.

  Nonglobal gateway commands are typically used for configuration activities. Nonglobal gateway commands are noted by a **G** in the "G" column of the command summary tables throughout this manual.

Commands that do not affect node operation, for example, display commands, are called **nongateway commands.** These commands may be directed to a local or remote node regardless of the gateway/nongateway status of the supervisory port or the supervisory computer port. Nongateway commands do not have an entry in the "G" column of the command summary tables throughout this manual.

NOTE: *Supervisory port and supervisory computer port gateway status cannot be selected via the local supervisory terminal. Gateway status is initially determined by Network Module DIP switch but can be changed by a SET GWY or CLR GWY command issued from a remote node. See Chapter 6, Configuration Commands.*

Nodal Security

Nodal security restricts a LINK/2+ System from accepting global gateway commands. When nodal security is enabled, all global gateway commands are interpreted by the LINK/2+ System as nonglobal gateway commands and are accepted only if both:

- The supervisory port or supervisory computer port originating the command is designated a gateway.
- The node number of the node originating the command is on the alarm notification list of the node receiving the command.

For information on setting and clearing nodal security, see Chapter 6, Configuration Commands.

Intermachine Link Security

Intermachine link security determines whether supervisory port or supervisory computer port commands issued from remote nodes will be accepted over a specified intermachine link. Enabling intermachine link security does **not** affect voice or data communications between nodes.

For more information on operation when intermachine link security is enabled, see Intermachine Link Parameters chapter in the LINK/2+ Configuration Planning Manual.

Redundant Operation

All LINK/2+ modules except I/O channel modules are capable of redundant operation. The following paragraphs describe the types of redundancy available for different modules.

The Network Module, Interlink Module, Voice Processor, Channelized Services Processor, Integrated Trunk Module, D-Channel Module, and Bypass Module can be configured for redundant operation. When redundancy is toggled, all channels supported by that module are first automatically disconnected and then automatically reconnected.

Redundant operation for the Voice Server Module is achieved with pooled redundancy, that is, connections on a failed Voice Server Module disconnect and reconnect using unassigned channels on another Voice Server Module.

For the X.50 Server Module, up to four primary and four redundant modules may be installed at a node. Modules are defined as either primary or redundant via a user entered command. An algorithm assigns a redundant X.50 Server Module to automatically take over for a failed primary X.50 Server Module. During redundancy switchover, the X.50 DS-0 channels and X.50 subrate channels remain fully connected.

When a redundant Power Supply Module is installed, both Power Supply Modules for that Mainframe share the load under normal operation. If either Power Supply Module fails, the remaining Power Supply Module assumes the full load for that Mainframe without traffic interruption.

Redundant operation of any of these modules occurs automatically when a failure is detected in the primary module. Redundant operation may also be activated via operator initiated command except for the Voice Server Module.

The Integrated Trunk and D-Channel Modules implement a form of redundancy called cold standby. When a primary Integrated Trunk Module or D-Channel Module fails, the redundant module comes online automatically. Integrated Trunk Module proprietary bundles are dropped and reconnected automatically.

Redundant Digital Termination Modules or Link Framing Modules can be used with redundant Interlink Modules, Voice Processors, Integrated Trunk Modules, and Channelized Services Processors. If either of the primary modules fails, the redundant pair of modules assumes operation. Some Digital Termination Module and Link Framing Module models have two independent units on a single module, allowing vertical redundancy. See the Modules section of the LINK/2+ Installation and Maintenance Manual for further information on redundancy capabilities of these modules.

FUNCTIONAL DESCRIPTION

The following paragraphs describe the function of all units and modules comprising a LINK/2+ System. A functional block diagram of a typical LINK/2+ System is shown in Figure 1-2.

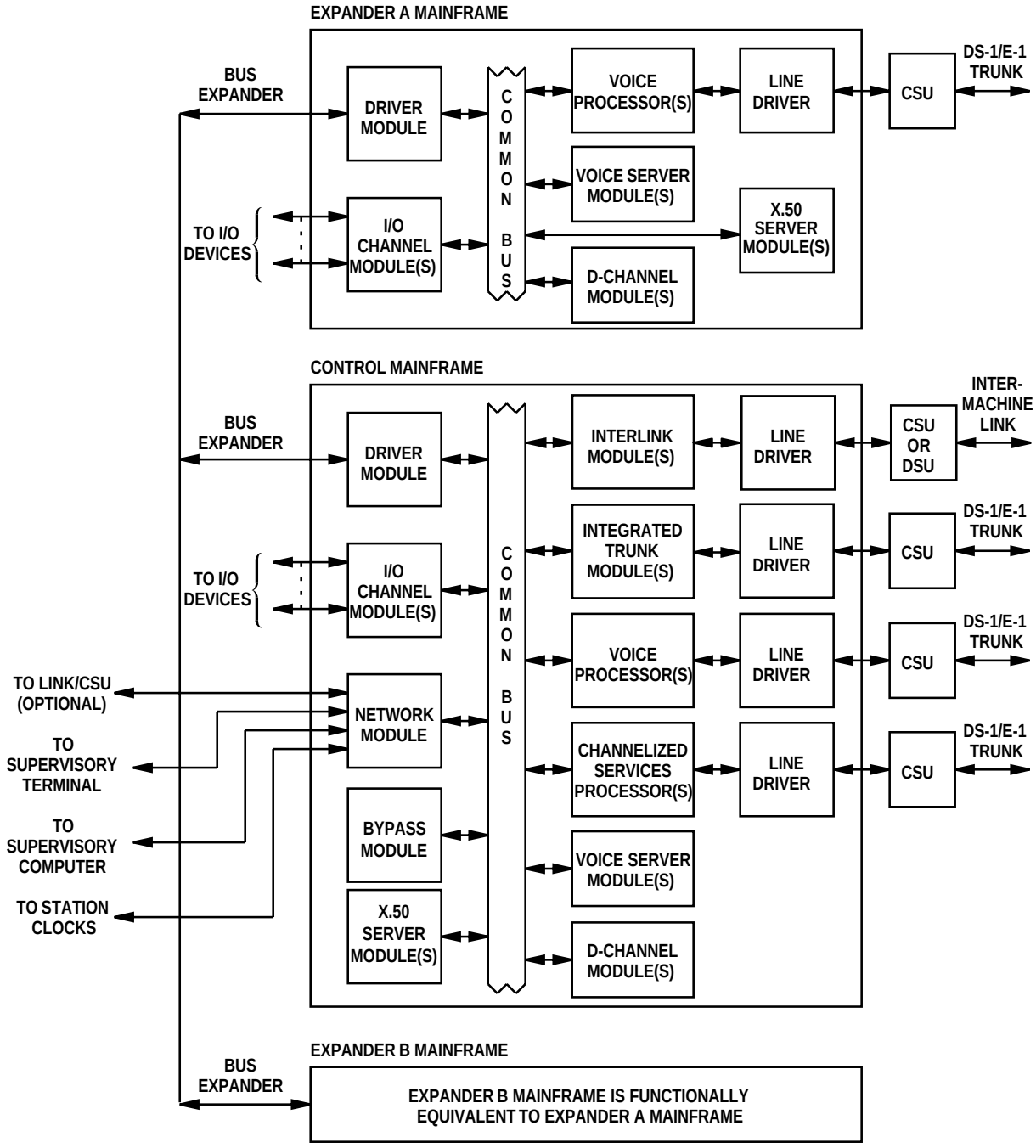
Mainframe

The Mainframe provides mounting and connectors for all modules. Mainframes are available with 6 slots (microLINK/2+), 13 slots (miniLINK/2+), or 18 slots. As shown in Figure 1-4, 18-slot Mainframe systems can include a Control Mainframe and one or two Expander Mainframes. See the LINK/2+ Configuration Planning Manual for information on the number and types of modules that can be installed in each Mainframe.

The **Line Termination System (LTS) Chassis** is a special type of Mainframe designed to accommodate up to 12 Line Termination Modules. An LTS Chassis is required when Subrate Channel Processors are installed in the LINK/2+ Mainframe (see "Data I/O Channel Modules" paragraph for a description of the Subrate Channel Processor). The LTS Chassis can be collocated with the LINK/2+ Mainframe or installed in a separate rack within cabling distance (approximately 50 feet) of the LINK/2+ Mainframe.

Fan Housing

The Fan Housing provides cooling for the 13-slot and 18-slot Mainframes. The 6-slot Mainframe has a Fan Tray Module which is integral to the Mainframe.



NOTES:
= LINE DRIVER CAN BE DIGITAL TERMINATION MODULE, LINK FRAMING MODULE, BIPOLAR INTERFACE MODULE, OR FACILITY INTERFACE MODULE.
CSU = CHANNEL SERVICE UNIT
DSU = DIGITAL SERVICE UNIT

Figure 1-2. Functional Block Diagram of Typical LINK/2+ System

Power Supply Chassis and Power Supply Module

The Power Supply Chassis provides mounting for Power Supply Module(s) for 18-slot Mainframes. Power Supply Modules for 6-slot and 13-slot Mainframes are integral to the Mainframe.

The Power Supply Module converts AC power into regulated +5 VDC and ±12 VDC required for operating a Mainframe. The Power Supply Module is the switching regulator type and incorporates control and logic circuits that provide for load sharing when a redundant Power Supply Module is installed (13-slot and 18-slot Mainframes only). If a Power Supply Module failure is detected, control is transferred to the redundant Power Supply Module without interruption of power to that Mainframe.

Network Module

The Network Module exercises primary microprocessor control over the LINK/2+ System. The Network Module processes commands from the supervisory terminal or supervisory computer, and provides the system clocks via phase locked loop.

- The Network Module **supervisory port** permits an attached asynchronous ASCII terminal or microcomputer to communicate with the Network Module microprocessor. The **supervisory computer port** permits the TIME/VIEW Network Management System (NMS) to communicate with the Network Module microprocessor. A supervisory terminal or network management system can access stored information to:

  - Define or display programming parameters
  - Display network configuration and connect status
  - Connect or disconnect channels
  - Define channel, bundle, and intermachine link routing
  - Initiate diagnostic tests and display test results

  A microcomputer attached to the **supervisory port** can be used to download operational software to the Network Module, Interlink Module, Integrated Trunk Module, VSM.3 and VSM.5 Voice Server Modules, and X.50 Server Module.

- The Network Module **external port** can be used to connect to a LINK Channel Service Unit (LINK/CSU). The LINK/CSU is an intelligent channel service and digital service unit combination that is programmable for either extended superframe (ESF) or D4 framing format. The LINK/CSU frees up slots in the LINK/2+ System Mainframe and provides up to 28 nonredundant or 14 redundant CSUs.

  A LINK/2+ supervisory terminal or network management system can issue commands to the LINK/CSUs in the network. For information on the LINK/CSU, see the LINK/CSU User's Guide.

- The Network Module **station clock port** allows one or two external clock sources (station clocks) to be connected to the Network Module. The LINK/2+ System can be programmed to use these station clocks to provide system clocking. Station clock speeds between 2400 bps and 2.048 Mbps are supported.

Driver Module

Driver Modules provide the interface between the 18-slot Control Mainframe and Expander Mainframe(s). When Expander Mainframes are used, a Driver Module must be installed in the Control Mainframe and in each Expander Mainframe.

Interlink Module

The Interlink Module provides the interface between the common bus and an intermachine link. The Interlink Module assembles the data frame, maintains intermachine link synchronization, and transfers data between the I/O channels and that intermachine link.

Interlink Modules are available that can be configured for:

- **Symmetrical operation** in which the transmit and receive speeds are the same
- **Asymmetrical operation** in which the transmit and receive speeds are different
- **Simplex operation** in which data is either transmitted or received but not both

A **Satellite Buffer option** for the Interlink Module provides additional buffer capability which compensates for variable delay times commonly associated with satellite transmissions.

Digital Termination Module

The Digital Termination Module interfaces with unframed North American T-1 or European megabit service. The module is available in both single and dual unit configurations. The Digital Termination Module interfaces directly with a CSU. For digital radio facilities, the Digital Termination Module interfaces directly with the DSX-1 interface of the transceiver.

Link Framing Module

The Link Framing Module (models LFM and LFM.1) interfaces with unframed or framed T-1 service. The LFM and LFM.1 Modules support D4 framing requirements of AT&T PUB 62411. The LFM Module supports ESF format as defined in Government of Canada Department of Communications specification CS-03.

An **Equalizer Linedriver Module** can be used with an LFM Module to meet Government of Canada Department of Communications specification CS-03 Issue 6 Supplement B Amendment 3 for connection to common carrier at distances up to 655 feet (200 meters).

The **LFM.3 Link Framing Module** interfaces with 2.048 Mbps digital services that conform to CCITT recommendation G.704.

The **LFM.5** and **LFM.6 Link Framing Modules** interface with the Nippon Telephone and Telegraph (NTT) Branching T-1 service. For further information on these modules, see the Link Framing Module Model LFM.5 and Link Framing Module Model LFM.6 User's Manuals.

The **LFM.9 Link Framing Module** provides independent station clock at 1.544 MHz to major nodal hubs in a network. The LFM.9 provides clock from one of two inputs to up to eight nodes. The module can switch between inputs without causing a clock fallback at the Network Module if one input fails.

The **LFM.10, LFM.11,** and **LFM.12 Link Framing Modules** provide n x 64 kbps or n x 56 kbps bundled output over T-1 facilities to enable low-cost access to fractional T-1 service. These modules create user-selected bundle sizes from 1 to 24 DS-0 channels at speeds from 56 kbps to 1.544 Mbps. Release 7 and later Link Framing Modules (LFM.10, LFM.11, and LFM.12) are software programmable. Pre-release 7 modules use DIP switches to set link framing parameters. For pre-release 7 modules, see the Link Framing Module Models LFM.10, LFM.11, and LFM.12 User's Manual for DIP switch settings.

The **LFM.14 Link Framing Module** combines four T-1 links together and provides the framing and electrical encoding for interfacing to the Japanese NTT High-Speed Secondary Service. This service allows a single 6.312 Mbps trunk to be divided into multiple n x 64 kbps bundles, where n ranges from 1 to 24.

Bipolar Interface Module

The Bipolar Interface Modules (BIM.1, BIM.2, and BIM.3) interface a Voice Processor, Channelized Services Processor, or Integrated Trunk Module to a DSX-1 or G.703 transmission facility. The Bipolar Interface Module converts the unipolar non-return-to-zero (NRZ) signal from the Voice Processor, Channelized Services Processor, or Integrated Trunk Module to alternate mark inversion (AMI) bipolar format.

The Bipolar Interface Module (64 kbps BIM) interfaces the ILC.2 Interlink Module, QSC.2 Quad Synchronous Module, or QSP.2 Quad Synchronous Processor Module to a G.703 transmission facility. The 64 kbps BIM supports G.703 64 kbps codirectional and contradirectional coding.

Integrated Trunk Module

The Integrated Trunk Module allows hybrid networking in a LINK/2+ network using industry-standard channelized services. Using the Integrated Trunk Module, networks can take advantage of public network services while maintaining cost effectiveness and network management control.

The Integrated Trunk Module uses a flexible, multipurpose channelization format in which varying numbers of DS-0s are grouped into proprietary and nonproprietary bundles. The Integrated Trunk Module can support up to 24 proprietary bundles per physical link, 24 DS-0 nonproprietary bundles per T-1 link, or 31 DS-0 nonproprietary bundles per E-1 link. The Integrated Trunk Module supports Switched 56K service, ISDN primary rate, and byte alignment.

Integrated Trunk Modules support configurations for:

- **T-1/NTT operation**, where the module (ILQ.1) supports line transmission rates of up to 1.544 Mbps for use in North American (T-1) and Japanese (NTT) networks

- **E-1 operation**, where the module (ILQ.2) supports line transmission rates of up to 2.048 Mbps for use in European (CEPT) networks

D-Channel Module

The D-Channel Module establishes the B-channel and/or H0-channel connections between two nodes as well as the signaling support for one of the 24 or 31 time slots on the Integrated Trunk Module.

The D-Channel Module supports multiple Q.931 protocols, including 4ESS, 5ESS, NTT, NUMERIS, DMS250/100, and Austel. The D-Channel Module supports carriers in different countries including AT&T in the United States, NTT in Japan, AOTC in Australia, and France Telecom.

Voice Processor

The Digital Voice Processor Module (Voice Processor) transfers DS-0 channels via time slot interchange between other LINK/2+ System modules and a DS-1 trunk. DS-0 channels can be locally or remotely connected to other DS-0 channels, Quad Voice Module channels, Enhanced Voice Module channels, Quad Synchronous Module channels, or Quad Synchronous Processor channels. A Voice Processor with ADPCM capability can convert PCM channels to ADPCM channels on a per channel basis to provide more efficient bandwidth utilization. Voice Processor channels can be processed by a Voice Server Module to achieve greater voice compression and echo cancellation. The Voice Processor can connect to a Digital Termination Module, Link Framing Module, or LINK/CSU.

The ILP.8 and ILP.13 Voice Processors provide access to Japanese TTC (Telecommunications Technology Committee) formatted PBXs.

A **Facility Interface Module (FIM.1)** is used with an ILP.8 or ILP.13 Voice Processor to provide electrical translation and isolation between the Voice Processor and the 2.048 Mbps TTC trunk.

Analog Voice I/O Channel Modules

The following analog voice I/O channel modules can be used in a LINK/2+ System:

- The **Quad Voice Module** converts analog voice signals to digital signals and vice versa using 16 kbps voice compression, continuously variable slope delta (CVSD) modulation, pulse code modulation (PCM), or adaptive differential pulse code modulation (ADPCM), depending on the model. In PCM mode, the Quad Voice Module produces a 64 kbps rate output for scanning by either the Voice Processor, Integrated Trunk Module, or Channelized Services Processor. Each Quad Voice Module contains four individual I/O voice channels. E & M interfacing for each I/O voice channel is included on the module. Quad Voice Module channels can be processed by a Voice Server Module to achieve greater voice compression and echo cancellation.

- The **Enhanced Voice Module** converts analog voice and Group III facsimile (fax) signals to digital signals and vice versa using voice compression or pulse code modulation (PCM). Each Enhanced Voice Module contains four individual I/O channels. Voice compression can be specified on a per channel basis, with compression rates of 6 kbps, 8 kbps, or 16 kbps at each channel.

  Echo cancellation can be specified on a per channel basis. E & M interfacing for each I/O voice channel is included on the module. In PCM mode, the Enhanced Voice Module produces a 64 kbps rate output for scanning by either the Voice Processor, Voice Server Module, Integrated Trunk Module, or Channelized Services Processor.

  Models EVM.2 and EVM.3 accept and convert fax signals for on-board compression and transmittal through the network. All Enhanced Voice Modules can accept fax signals for compression through the VSM.1 or VSM.3 Voice Server Module. Model EVM.3 also supports nonstandard fax functions beyond the Group III standard.

- The **Foreign Exchange Office Module** accepts four 2-wire loop or ground start analog voice circuits for conversion to digital signals and vice versa using voice compression or pulse code modulation (PCM).

  - For the FXO Foreign Exchange Office Module, voice compression can be specified on a per channel basis with rates of 8 kbps or 16 kbps using adaptive sub-band excited transformation (ASET) compression..

  - For the FXO.1 Foreign Exchange Office Module, voice conversion is provided for each channel using 64 kbps PCM.

  - For the FXO.3 Foreign Exchange Office Module, voice compression can be specified on a per channel basis with rates of 5.33 kbps or 8 kbps using codebook excited linear prediction (CELP) compression and 16 kbps using adaptive transform coding (ATC) compression.

  When FXO channels are directed to the VSM.1 or VMS.3 Voice Server Module by voice profile programming, fax transmissions are also accepted.

  An **FXO/Network Termination Module** is supplied with a Foreign Exchange Office Module for connection to the Central Office.

- The **Foreign Exchange Station Module** accepts four 2-wire loop or ground start analog voice circuits for conversion to digital signals and vice versa using voice compression or pulse code modulation (PCM).

  - For the FXS Foreign Exchange Station Module, voice compression can be specified on a per channel basis with rates of 8 kbps or 16 kbps using ASET compression.

  - For the FXS.1 Foreign Exchange Station Module, voice conversion is provided for each channel using 64 kbps PCM.

  - For the FXS.3 Foreign Exchange Station Module, voice compression can be specified on a per channel basis with rates of 5.33 kbps or 8 kbps using CELP compression and 16 kbps using ATC compression.

  When FXS channels are directed to the VSM.1 or VSM.3 Voice Server Module by voice profile programming, fax transmissions are also accepted.

  An **FXS/Network Termination Module** is supplied with a Foreign Exchange Station Module for connection to the Subscriber.

- The **QVC Voice Module** converts analog voice signals to digital signals and vice versa using CVSD modulation. Each QVC Voice Module contains four individual I/O voice channels. Two E & M Interface Modules are also supplied. Each E & M Interface Module handles two I/O voice channels.

Voice Server Module

The Voice Server Module provides voice compression, echo cancellation, and fax transmission for Voice Processor and Integrated Trunk Module channels as well as for Quad Voice Module, Enhanced Voice Module, Foreign Exchange Office Module, and Foreign Exchange Station Module I/O channels.

The VSM and VSM.1 Voice Server Modules compress a 64 kbps channel to 8 or 16 kbps, with or without echo cancellation, using ASET compression. Each Voice Server Module supports up to 31 channels. In addition to voice, the VSM.1 Voice Server Module supports up to eight simultaneous Group III facsimile (fax) connections. The VSM.1 Voice Server Module monitors for fax transmission and switches automatically from voice to fax operation.

The VSM.3 Voice Server Module compresses a 64 kbps channel to 5.33 or 8 kbps using CELP compression and 16 kbps using ATC compression, with or without echo cancellation. Each VSM.3A Voice Server Module supports up to 8 channels and each VSM.3B Voice Server Module supports up to 16 channels. In addition to voice, the VSM.3 Voice Server Module supports nonstandard fax or Group III fax connections. The VSM.3 Voice Server Module monitors for fax transmission and switches automatically from voice to fax transmission.

The VSM.5 Voice Server Module is capable of two modes of operation, **clear mode** and **STU-III Secure Mode**. In clear mode, the VSM.5 compresses a 64 kbps PCM channel to 4.8 or 9.6 kbps using VCELP compression, with or without echo cancellation. In the STU III Secure Mode, the VSM.5 can transport encrypted secure voice and data at rates of 2.4, 4.8, or 9.6 kbps. Each VSM.5 Voice Server Module supports up to 12 channels. The VMS.5 Voice Server Module monitors the modem signal and dynamically switches between clear and secure modes without user intervention.

NOTE: *The VSM.3 and VSM.5 CELP compression schemes are not compatible with each other.*

If multiple Voice Server Modules are installed, they operate in a pooled redundancy mode.

Channelized Services Processor

The Channelized Services Processor scans for, constructs, and transfers contiguous and noncontiguous 64 kbps bundles between the D4 or G.732 formatted devices and a DS-1/E-1 trunk in a framed format at either 1.544 or 2.048 Mbps. In an appropriate bundle configuration, the Channelized Services Processor supports fractional T-1 applications. See the LINK/2+ Configuration Planning Manual for information on bundle configurations. The Channelized Services Processor can connect to a Digital Termination Module, Link Framing Module, or LINK/CSU.

X.50 Server Module

The X.50 Server Module takes 64 kbps X.50 framed DS-0 channels from the X.50 network locally via an Interlink Module, Integrated Trunk Module, Channelized Services Processor, Voice Processor, Quad Synchronous Processor Module, or Quad Synchronous Module and demultiplexes the X.50 DS-0 channels into synchronous X.50 subrate channels of 2400, 4800, 9600, or 19200 bps.

The X.50 subrate channels can be:

- Passed on to a Quad Synchronous Processor Module or Quad Synchronous Module for use by a local I/O device (local subrate drop).
- Remultiplexed by an Integrated Trunk Module (via a Bypass Module) or Interlink Module for transmission over a T-1 or E-1 network (bridge, or remote subrate drop).
- Passed through the Bypass Module and back to an X.50 Server Module to be remultiplexed by the X.50 Server Module and sent to the X.50 network via another Voice Processor Module, Quad Synchronous Processor Module, or Quad Synchronous Module (drop and insert).

Each X.50 Server Module supports up to 16 X.50 Division 2 or Division 3 framed DS-0 channels. Up to four primary and four redundant X.50 Server Modules can be installed at a node.

Bypass Module

The Bypass Module provides channel bypassing capability at a node. Full duplex data and control functions originating at one node may be routed through as many as seven intermediate bypass nodes to a destination node.

The local and remote connections of the Channelized Services Processor or Integrated Trunk Module to the Interlink Module or another Channelized Services Processor or Integrated Trunk Module are also established via the Bypass Module.

Data I/O Channel Modules

The following data I/O channel modules can be used in a LINK/2+ System:

- The **Quad Synchronous** and **Dual Synchronous Modules** provide the interface between I/O data channels and the common bus. Each Quad Synchronous Module contains four individual synchronous I/O data channels. Each Dual Synchronous Module contains two high speed synchronous I/O data channels. The Quad Synchronous and Dual Synchronous Modules have the ability to supply n x 64 kbps rates to be formatted in bundles by the Channelized Services Processor and placed on a DS-1/E-1 trunk. The Quad Synchronous Module can supply n x 56 kbps or n x 64 kbps rates for placement on a T-1 or E-1 interface by the Integrated Trunk Module.

  The **QSC.7 Quad Synchronous Module** has a single application of converting 56 kbps subrate data channels into 64 kbps logical DS-0 channels.

- The **Quad Synchronous Processor** provides the interface between I/O data channels and the common bus. Each Quad Synchronous Processor contains four individual synchronous I/O data channels supporting the range of data rates from 50 bps to 1.984 Mbps. All ports can operate simultaneously at 1.984 Mbps. The Quad Synchronous Processor has the ability to supply n x 64 kbps rates to be formatted in bundles by the Channelized Services Processor and placed on a DS-1/E-1 trunk. The Quad Synchronous Processor has the ability to supply n x 56 kbps or n x 64 kbps rates to be formatted in bundles by the Integrated Trunk Module and placed on a DS-1/E-1 trunk. The Quad Synchronous Processor can be configured for symmetrical, asymmetrical, or simplex operation.

  Individual channels on a Quad Synchronous Processor can be configured to operate in the following special modes:

  - **Broadcast/polling mode—**In broadcast/polling mode, a single channel at a central host site can connect to multiple remote channels called a nest poll group. The channels forming the nest poll group must reside in the same nest (LINK/2+ Mainframe). The communication between the host channel and the remote nest poll group uses only one time slot in the connecting intermachine link. When the host channel transmits, all nest poll group channels receive the transmission. Only one nest poll group channel can transmit at a time.

  - **56K/64K mode—**Switched 56K service provides 56 kbps of data communication on a dial-up basis. In switched 56K and nonswitched 56K modes, data is always transmitted at 56 kbps. In switched 56K mode, the Quad Synchronous Processor performs speed translation from 56 kbps to 64 kbps (DS-0) format by "stuffing" the eighth bit with signaling and dialing information received from a Terminal Interface Unit (TIU). In nonswitched 56K mode, the eighth bit is stuffed with a 1. A Quad Synchronous Processor operating in switched 56K mode can be scanned by an Interlink Module (for networking to a remote node) or by a Voice Processor, Integrated Trunk Module, or Channelized Services Processor.

  - **LPDA-1 mode—**LPDA-1 (Link Problem Diagnostic Aid) is an IBM test protocol that allows a front end processor (FEP) to obtain test information from a pair of remote modems. In LPDA-1 mode, the Quad Synchronous Processor channel allows function transmission in inband mode which guarantees compliance with ones density. Any transition of the function lead (F3 IN) will be communicated from the FEP to the modem

to start test mode, even if the Quad Synchronous Processor channel is in data mode. Test mode continues until another transition of the F3 IN function is sent by the FEP.

- **Simplex broadcast mode—**In simplex broadcast mode, a single originator channel at one node can connect to multiple terminator channels at other nodes. When the originator channel transmits, all terminator channels receive the transmission, but the terminator channels cannot transmit back to the originator.

- The **Quad Asynchronous Module** provides the interface between I/O data channels and the common bus. Each Quad Asynchronous Module contains four individual asynchronous I/O data channels.

- The **Dual Isochronous Module** provides the interface between I/O data channels and the common bus. Each Dual Isochronous Module contains two I/O data channels that can be independently configured for isochronous, plesiochronous, or asynchronous operation.

- The **Isochronous Communication Module** provides the interface between I/O data channels and the common bus. Each Isochronous Communication Module contains two I/O data channels that can be independently configured for isochronous or plesiochronous operation. The Isochronous Communication Module provides frequency discrimination, I/O rates up to 1.544 Mbps, plus more speeds than available on the Dual Isochronous Module.

- The **Subrate Channel Processor** is intended for generation of 64 kbps DS-0 channels from customer subrate data and 56 kbps data in a DDS environment. The Subrate Channel Processor can support DS-0A or DS-0B signal formats and any mix of primary/secondary channel capability.

  - In **DS-0A configuration,** the Subrate Channel Processor emulates the Office Channel Unit (OCU) functionality. Four independent ports at the standard subrates (2.4, 4.8, or 9.6 kbps), secondary port rates (3.2, 6.4, or 12.8 kbps), and 56/72 kbps are supported, depending on the model. On a per port basis, a 64 kbps DS-0 channel is generated. The overall throughput is 256 kbps (four DS-0 channels). Data to and from the network is carried over four independent DS-0A formatted channels through an Interlink Module or Voice Processor.

  - In **DS-0B configuration,** the Subrate Channel Processor integrates the functionality of the OCU and Subrate Data Multiplexers (SRDM). Up to five standard subrates or secondary port rates are multiplexed into a single 64 kbps channel. Data to and from the network is carried over a single DS-0B formatted channel through an Interlink Module, Integrated Trunk Module, or Voice Processor.

  A **Line Termination Module** is required to terminate the Subrate Channel Processor connection. Each Line Termination Module supports up to two Subrate Channel Processors. Line Termination Modules are installed in a separate LTS Chassis (see "Mainframe" paragraph).

SPECIFICATIONS

The LINK/2+ System operates as a microprocessor based synchronous, time division, character interleaved multiplexer. A nonvolatile memory maintains the user programmed database for approximately 45 days (between 0° and 60° C) without AC power.

Table 1-1 lists additional specifications for each Mainframe type.

Table 1-1. Specifications

Specification	18-Slot LINK/2+ System	13-Slot miniLINK/2+ System	6-Slot microLINK/2+ System
Physical Configuration	Rack mounted only	Rack mounted only	Free standing with case Rack mounted without case
Size	Control Mainframe or Expander Mainframe: 13 1/8" (33.3 cm) high by 19" (48 cm) wide by 20 1/4" (51.6 cm) deep Fan housing: 5 1/4" (13.3 cm) high by 19" (48 cm) wide by 20 1/4" (51.6 cm) deep Power Supply Chassis: 7" (17.8 cm) high by 19" (48 cm) wide by 20 1/4" (51.6 cm) deep	Mainframe: 13 1/8" (33.3 cm) high by 19" (48 cm) wide by 20 1/4" (51.6 cm) deep Fan Housing: 3 1/2" (8.9 cm) high by 19" (48 cm) wide by 16 1/2" (41.9 cm) deep Power Supply Chassis (optional; used for -48 VDC E & M Power Supply Module): 7" (17.8 cm) high by 19" (48 cm) wide by 20 1/4" (51.6 cm) deep	With case: 23 1/4" (59 cm) high by 8 3/8" (21.3 cm) wide by 24 3/4" (62.9 cm) deep Floor plate: 13 3/8" (34 cm) wide Without case: 22 3/4" (57.8 cm) high by 6 3/4" (17.1 cm) wide by 20 3/8" (51.8 cm) deep
Weight	Control Mainframe or Expander Mainframe (without internal power supplies or modules): 24.5 lbs (11.1 kg) Typical Module: 2.5 lbs (1.1 kg) Fan housing: 10 lbs (4.5 kg) Power Supply Chassis: 16.6 lbs (7.5 kg) Power Supply Module: 18.5 lbs (8.4 kg)	Mainframe (without internal power supplies or modules): 24.5 lbs (11.1 kg) Typical Module: 2.5 lbs (1.1 kg) Fan Housing: 6.5 lbs (2.95 kg) Power Supply Module: 18.5 lbs (8.4 kg) Power Supply Chassis (optional; used for -48 VDC E & M Power Supply Module): 16.6 lbs (7.5 kg)	With case: 60 lbs (27.2 kg) Without case: 33 lbs (15 kg)
Power Requirements	Each Mainframe: • 115/230 VAC Power Supply Module: 115 ±10 VAC at 12A or 230 ±20 VAC at 6A, 47 to 63 Hz, single phase • 100/200 VAC Power Supply Module: 100 VAC ±10 VAC at 15A or 200 ±20 VAC at 8A, 47 to 63 Hz, single phase • -48 VDC Power Supply Module: input 42 to 58 VDC not to exceed 24A -48 VDC E & M Power Supply Module for certain voice signaling types: 115 ±10 VAC at 3A or 230 ±20 VAC at 1.5A, 47 to 63 Hz, single phase	115/230 VAC Power Supply Module: 115 ± 10 VAC at 12A or 230 ±20 VAC at 6A, 47 to 63 Hz, single phase 100/200 VAC Power Supply Module: 100 VAC ±10 VAC at 15A or 200 ±20 VAC at 8A, 47 to 63 Hz, single phase -48 VDC Power Supply Module: input 42 to 58 VDC not to exceed 24A -48 VDC E & M Power Supply Module for certain voice signaling types: 115 ±10 VAC at 3A or 230 ±20 VAC at 1.5A, 47 to 63 Hz, single phase	115/230 VAC Power Supply Module: 115 ±10 VAC at 5A or 230 ±20 VAC at 2.5A, 47 to 63 Hz, single phase -48 VDC Power Supply Unit for certain E & M voice signaling types: 115 ±10 VAC at 0.25A or 230 ± 20 VAC at 0.125A, 47 to 63 Hz, single phase

Table 1-1. Specifications (Cont'd)

Specification	18-Slot LINK/2+ System	13-Slot miniLINK/2+ System	6-Slot microLINK/2+ System
Power Requirements (Cont'd)	Fan Assembly: • 115 ±10 VAC at 0.9A or 230 ±20 VAC at 0.45A, 47 to 63 Hz, single phase • -48VDC: 0.4A at 48 VDC	Fan Assembly: 115 ±10 VAC at 0.5A or 230 ±20 VAC at 0.25A Fan Assembly, -48VDC: 0.3A at 48 VDC	
Power Consumption	1000 watts maximum per Mainframe 250 watts maximum per -48 VDC E & M Power Supply Module	685 watts maximum per chassis 80 watts maximum per -48 VDC E & M Power Supply Module	280 watts maximum 30 watts maximum per -48 VDC Power Supply Unit
Heat Dissipation	3400 BTUs/hour (1000 watts) maximum per Mainframe plus 850 BTUs/hour (250 watts) maximum per -48 VDC E & M Power Supply Module	2330 BTUs/hour (685 watts) maximum plus 280 BTUs/hour (80 watts) maximum per -48 VDC E & M Power Supply Module	958 BTUs/hour (280 watts) maximum plus 103 BTUs/hour (30 watts) maximum per -48 VDC Power Supply Unit
Environmental Requirements	Ambient operating temperature from 0° to 45° C Relative humidity to 95% (noncondensing) Altitude to 12,000 ft. (3660 m)	Ambient operating temperature from 0° to 45° C Relative humidity to 95% (noncondensing) Altitude to 12,000 ft. (3660 m)	Ambient operating temperature from 0° to 45° C Relative humidity to 95% (noncondensing) Altitude to 12,000 ft. (3660 m)

Chapter 2

Getting Started

Information you need to start using the LINK/2+ System is contained in this chapter:

- Power application and turn-off
- Self-test and other start-up activities
- Accessing the supervisory port
- Supervisory port log in and log out
- Loading Network Module/Interlink Module operational software
- Loading Integrated Trunk Module operational software
- Loading X.50 Server Module operational software
- Loading VSM.3 and VSM.5 Voice Server Module operational software
- Opening and closing Mainframe door

This chapter assumes the LINK/2+ System has already been properly configured and installed. If not, see the LINK/2+ Configuration Planning Manual and the Installation section of the LINK/2+ Installation and Maintenance Manual.

Day-to-day management of the LINK/2+ System can be performed via the integral supervisory port or the optional TIME/VIEW 2000 Network Management System. This manual discusses supervisory port operation only. For information on using TIME/VIEW, see the TIME/VIEW 2000 documentation.

Typical network management activities that the operator can perform from the supervisory terminal once the LINK/2+ System is powered up include:

- Monitoring system status and alarm messages. See Chapter 5, Display Commands.
- Connecting/disconnecting channels and performing other configuration activities. See Chapter 6, Configuration Commands.
- Performing diagnostic tests. See Chapter 7, Diagnostic Commands.

POWER APPLICATION AND TURN-OFF

Procedure 2-1 defines the power turn-on sequence for each LINK/2+ System. Procedure 2-2 defines the power turn-off sequence.

Procedure 2-1. Power Turn-On

1. Ensure that all channel devices and external line drivers are turned on and operational.

2. If local supervisory terminal is to be used, ensure that terminal is turned on and operational.

3. For 18-slot Mainframes, remove power supply grille.

For 13-slot (miniLINK/2+) Mainframes, open Mainframe door.

4. For 18-slot and 13-slot Mainframes, set POWER switch on Power Supply Module(s) to 1 and observe that:

- POWER ON (green) indicator is lit.
- ON LINE (green) indicator is lit on in-control Power Supply Module.
- LOAD SHARE (yellow) indicator is lit on in-control Power Supply Module (redundancy) or is off if only a single Power Supply Module (no redundancy) is installed.

Go to step 6.

5. For 6-slot (microLINK/2+) Mainframes:

A. Ensure power cord from Power Supply Module is connected to rear of Fan Tray Module.

B. Apply power by connecting power cord from Fan Tray Module to AC power source.

C. Ensure that both fans in Fan Tray Module are rotating.

PRECAUTION: ***If one or both of the fans fail to operate, unplug the power cord from rear of chassis immediately. See Fan Tray Module replacement procedure in the LINK/2+ Installation and Maintenance Manual.***

6. The LINK/2+ System performs a self-test. (See "Self-Test" paragraph.) If the self-test is successful, the LINK/2+ System is ready for operation. If an error occurs, see the Troubleshooting chapter in the LINK/2+ Installation and Maintenance Manual.

7. If Line Termination System (LTS) Chassis and Line Termination Modules are installed, connect -48 VDC power source at rear of chassis.

8. For 18-slot Mainframes, reinstall power supply grille.

For 13-slot Mainframes, close Mainframe door.

Procedure 2-2. Power Turn-Off

1. Notify all concerned parties that the LINK/2+ System is being shut down.

2. If LTS Chassis and Line Termination Modules are installed, disconnect -48 VDC power source at rear of chassis.

3. For 18-slot Mainframes, remove power supply grille.

   For 13-slot (miniLINK/2+) Mainframes, open Mainframe door.

4. For 18-slot and 13-slot Mainframes, set POWER switch on Power Supply Module(s) to 0.

   For 6-slot (microLINK/2+) Mainframes, disconnect power cord from AC power source.

   All indicators go off.

SELF-TEST AND OTHER START-UP ACTIVITIES

The following paragraphs discuss activities that occur after system start-up and during system operation:

- Self-test
- Bit error rate (BER) test
- Channel connections
- Alarm indicators and messages

Self-Test

When power is applied to the LINK/2+ System, the Network Module ON LINE indicator lights and the system automatically resets and runs a self-test diagnostic procedure The self-test routine checks the hardware and firmware of the following modules:

- Network Module
- Interlink Module
- Integrated Trunk Module
- X.50 Server Module
- Voice Processor
- D-Channel Module
- Channelized Services Processor
- Enhanced Voice Module
- Voice Server Module
- Dual Isochronous Module

- Isochronous Communication Module
- Foreign Exchange Office Module
- Foreign Exchange Station Module
- Quad Asynchronous Module

The supervisory terminal lists each test as it is performed on the Network Module in the following order:

```
NCL BOOT STARTUP TESTS
          RAM  -  OK
         PROM  -  OK

NCL STARTUP TESTS
         UART  -  OK
          ECP  -  OK
     DATABASE  -  OK D2
          RTC  -  OK
          PLL  -  OK
```

NOTES: *The "68020 - ERROR" message is displayed only if one of the 68020 CPU diagnostic tests fail.*

The "DIP SWITCH 8 OFF" message is displayed only if DIP Switch K1-8 on the Network Module is incorrectly set to the OFF/OPEN position.

The "ERROR BATTERY" message is displayed only if one, or both, batteries on the Network Module are defective or low in voltage.

- If the Network Module self-test is satisfactory and passwords have been previously defined:
  - Module comes online.
  - Message, LINK/2 (or microLINK/2) Supervisory Port On-Line, appears on the supervisory terminal.
  - Password prompt (ENTER PASSWORD:) appears. See "Supervisory Port Log In" paragraph.

  After password is entered correctly:

  - Time and date appear on the supervisory terminal.
  - Prompt (Nxxxx>) appears. (xxxx is the local node number.)
- If the Network Module self-test is satisfactory and passwords have not been previously defined:
  - Module comes online.

- Message, LINK/2 (or microLINK/2) Supervisory Port On-Line, and time and date appear on the supervisory terminal.

- Prompt (Nxxxx>) appears.

- If the Network Module self-test is NOT satisfactory and a redundant Network Module is installed, the LINK/2+ System switches to the redundant Network Module. The supervisory terminal lists the self-test messages for this Network Module.

- If any error messages appear or alarm indicators light, see the Troubleshooting chapter in the LINK/2+ Installation and Maintenance Manual.

Self-tests of the Interlink, Integrated Trunk, D-Channel, Voice Processor, Channelized Services Processor, Dual Isochronous, Isochronous Communication, Enhanced Voice, Foreign Exchange Office, Foreign Exchange Station, Quad Asynchronous, Voice Server, and X.50 Server Modules are run during the Network Module self-test, but no messages are displayed on the supervisory terminal for these modules.

- If the self-tests of the Interlink, Integrated Trunk, D-Channel, Voice Processor, Channelized Services Processor, Isochronous Communication, Enhanced Voice, Foreign Exchange Office, Foreign Exchange Station, Voice Server, and X.50 Server Modules are satisfactory:

  - Module's ON LINE indicator lights.

  - Module comes online.

- If the self-tests of the Dual Isochronous and Quad Asynchronous Modules are satisfactory, the modules come online, but no indicators light.

- If any error messages appear or alarm indicators light, see the Troubleshooting chapter in the LINK/2+ Installation and Maintenance Manual.

Bit Error Rate (BER) Test

Upon start-up, each Interlink Module and proprietary bundle on an Integrated Trunk Module continuously performs a BER test to determine the quality of the transmission facility. The BER results are averaged over several half-minute periods (windows) and then categorized based on the values presented in Table 2-1. BER status can be displayed with the DSP ST DL command; see Chapter 5, Display Commands. BER is not calculated on a simplex transmit only intermachine link.

The BER affects connections in the following manner:

- Connections are disallowed if the BER fails to exceed POOR at least once following power-up or reset.

- If an ABM profile is used, channels can be automatically connected or rerouted only over intermachine links meeting the user-specified link error performance level.

Table 2-1. BER Levels

BER Level	Description
VERY GOOD	Better than 1×10^{-5}
GOOD	Between 1×10^{-5} and 1×10^{-4}
FAIR	Between 1×10^{-4} and 1×10^{-3}
POOR	Worse than 1×10^{-3}

Channel Connections

The LINK/2+ System automatically connects **noncontention** channels after start-up. For I/O channels designated as **contention** channels, the LINK/2+ System allocates bandwidth dynamically, at the request of the user (via I/O module control signals). A bandwidth contention channel will be automatically connected if the following conditions exist:

- The request function (I/O module control signal) for that channel is activated.
- Sufficient bandwidth is available.

Channel connect messages for noncontention channels are displayed on the supervisory terminal; see "Alarm Indicators and Messages" paragraph.

When the network is configured, individual channels or groups of channels can be designated as noncontention channels or as bandwidth contention channels, according to the application. For example, the noncontention channels may use all of the bandwidth during daytime operations. The contention channels can come online when bandwidth becomes available due to some noncontention channels being programmed to be disconnected at a specific time in the evening. For information on configuring channels as contention or noncontention, see the LINK/2+ Configuration Planning Manual.

When used with the Integrated Trunk Module, the D-Channel Module can provide dial-up connections between nodes, as well as bandwidth expansion and backup or redundancy of existing intermachine links.

For commands used to connect and disconnect channels, see Chapter 6, Configuration Commands.

Alarm Indicators and Messages

To inform the user of a problem or status:

- Module alarm indicators light.

- Unsolicited alarm messages are displayed on the supervisory terminal when system errors occur, when define (DEF) or SET commands are issued, and at a fixed time interval until the alarm is cleared. Other alarm conditions must be solicited by entering the DSP AQ command.

- Unsolicited channel connected and not connected messages are also displayed on the supervisory terminal.

NOTE: *The supervisory terminal will NOT display unsolicited messages if the SET MUM LOC command has been entered. To resume the display of unsolicited messages, enter the CLR MUM LOC command. See Chapter 4, Support Commands.*

The supervisory terminal will NOT display continuous occurrences of alarm 07 (intermachine link declared out-of-service) if the DEF DL parameter alarm 7 masking (AL7MASK) is set to ON. See Intermachine Link Parameters chapter in the LINK/2+ Configuration Planning Manual.

Alarm 04 (power supply failure) does not occur in the microLINK/2+ System, and alarm 08 (fan failure) does not indicate a fan failure in the microLINK/2+ System. The Fan Fail Alarm Defeat Plug (FFD) must be installed to avoid continuous display of alarm 08. If the Power Supply Module fails or the fans stop rotating, see the LINK/2+ Installation and Maintenance Manual for replacement procedure.

If an alarm condition occurs, see the Troubleshooting chapter in the LINK/2+ Installation and Maintenance Manual. For a summary of error and status messages, see Appendix A.

ACCESSING THE SUPERVISORY PORT

If a local supervisory terminal is to be used, the LINK/2+ System must be programmed by Network Module DIP switch to use default supervisory port parameter values or parameter values stored in the database:

- If Network Module DIP switch is set to use default supervisory port parameter values, the parameter values take effect when power is applied to the LINK/2+ System. Default supervisory port parameter values are:

  - speed: 9600 bps

  - stop bits: 1

  - data bits/parity: 8 data bits, no parity

- If Network Module DIP switch is set to use parameters from the database, supervisory port parameter values must be defined from a supervisory port or a supervisory computer port. See "Define Supervisory Port Parameters (DEF SP) Command" paragraph in Chapter 6, Configuration Commands.

The supervisory port is online when the LINK/2+ System is turned on. To access the supervisory port:

- Ensure that:
  - Supervisory terminal is connected to LINK/2+ System.
  - Supervisory port parameter values have been defined.
  - Supervisory terminal is turned on and operational.
- If passwords have been defined, log in per "Supervisory Port Log In" paragraph.
- Prompt (Nxxxx>) must be displayed before commands can be entered. If prompt is not displayed, enter Control C character or BREAK.

To prevent unauthorized supervisory port access, log out per "Supervisory Port Log Out" paragraph when you are finished at the supervisory terminal.

Supervisory Port Log In

If passwords have been defined, the password prompt (ENTER PASSWORD:) appears on the supervisory terminal whenever power is applied or a reset occurs to the LINK/2+ System. To log in to the LINK/2+ System, carefully key in the correct password, then press RETURN key.

If the password is entered correctly:

- Time and date appear on the supervisory terminal.
- Prompt (Nxxxx>) appears.

NOTE: *If the password is not entered correctly, the password prompt (ENTER PASSWORD:) appears again on the supervisory terminal. If the password is entered incorrectly three times, the LINK/2+ System will wait 30 seconds before allowing further password attempts. See your system manager for correct password.*

If necessary, passwords can be disabled. See the Network Module chapter in the LINK/2+ Installation and Maintenance Manual.

The password used to log in determines the commands that you are allowed to use. See "System Security Features" paragraphs.

Supervisory Port Log Out

To prevent unauthorized system access, you can log out of the LINK/2+ System in two ways:

- By entering the EX command. At the prompt (Nxxxx>), type EX to log out. If prompt is not displayed, enter Control C character or BREAK.

- By a time out. If the log in time out parameter is enabled, you will be logged out if no keystroke is entered for 30 minutes.

After logging out of the LINK/2+ System:

- Message "Logged Out" appears on the supervisory terminal.
- Time and date appear.
- Password prompt "ENTER PASSWORD:" appears.

NETWORK MODULE/INTERLINK MODULE OPERATIONAL SOFTWARE

The LINK/2+ System is shipped with the Network Module/Interlink Module operational software already installed in the Network Module(s). Two copies of the software reside on each Network Module; a copy in each of two flash memory banks. In addition, a high density, 3.5-inch floppy disk containing the operational software is also provided.

NOTE: *The Interlink Module software is resident on the Network Module and is automatically loaded to the Interlink Modules by the Network Module. No separate action by the user is required.*

If a new version of the software is released, perform the following procedure to load the operational software, provided on the floppy disk, from a microcomputer to the Network Module.

Procedure 2-3. Loading Network Module/Interlink Module Operational Software

1. Determine the supervisory port parameters for use in configuring the microcomputer by entering the DSP SP command. Record these parameters:

- SPEED: for example, 9600 bps
- STOP: 1 stop bit (required setting)
- DATA: 8 data bits, no parity (required setting)

If the STOP and DATA parameters do not match the required settings, enter the DEF SP command to change the supervisory port parameters to the required settings.

2. Connect the serial port of the microcomputer to the supervisory port of the LINK/2+ System. The microcomputer should have the following:

- High-density 3.5-inch floppy disk drive
- Serial port
- Communications application software containing XMODEM with CRC file transfer protocol (compatible with ProComm Plus 2.01)

3. Using the parameters recorded in step 1 for the supervisory port, configure the microcomputer communications application software for the same parameters.

4. Verify that the communications application is running correctly by entering a supervisory port command such as DSP TIM.

5. Verify (on the disk label) that the version of the operational software is correct prior to loading and record the filename.

6. Insert the operational software disk into the microcomputer.

7. Replace the operational software in the offline bank of flash EPROM with the new operational software by entering:

LOA SW n:ss (or LOA SW n:ss/F)

NOTE: *If the terminal emulation program running on the microcomputer supports a speed of 57600 bps, you can use the optional /F modifier with the LOA SW command to download the operational software at a speed of 57600 bps to the Network Module.*

You do not need to reconfigure the SP port speed to 57600 bps when using the /F modifier as the Network Module automatically switches the SP port to this speed. However, you do need to reconfigure the emulation program speed to 57600 bps.

The following message is displayed:

ERASING OFFLINE-FLASH

NOTE: *To abort the LOA SW command, enter CONTROL C. If the file transfer has been started, press ESC to abort the file transfer.*

When erasing is complete, the following message is displayed:

CONNECT SP PORT TO PC AND INVOKE XMODEM PROTOCOL.

C's appear on the screen until the file transfer is started.

8. Set the file transfer protocol on the microcomputer to XMODEM to send the file from the microcomputer to the LINK/2+ System. Enter the path and filename recorded from the disk label.

If successful, the load process takes about 12 minutes (at 9600 bps). If not successful, repeat step 7.

PRECAUTION: ***The TGL BNK command is used to upgrade the system. Issuing this command to an online Network Module will automatically reset the node.***

9. When ready to upgrade, enter:

TGL BNK n:ss

The LINK/2+ System resets. The offline bank of flash EPROM becomes the online bank.

The Network Module is now using the new operational software and the new operational software is automatically loaded to all Interlink Modules in the node.

Observe that the start-up self-test is successful.

10. If the new operational software is to be loaded onto the other bank, enter:

COP SW n:ss

where ss is the slot number of the online Network Module.

11. If a redundant pair of Network Modules exists and if the new operational software is to be loaded onto the offline Network Module, copy the new version of operational software from the online Network Module to the offline bank of the offline module by entering the following commands:

COP SW $n:ss_1$ $n:ss_2$

where $n:ss_1$ is the source module slot location and $n:ss_2$ is the destination module slot location.

TGL BNK n:ss

where ss is the slot number of the offline Network Module.

The offline Network Module resets. The offline bank of flash EPROM becomes the online bank.

12. If the new operational software is to be loaded onto the second bank of the offline Network Module, issue the following command to the online Network Module:

COP SW $n:ss_1$ $n:ss_2$

where $n:ss_1$ is the source module slot location and $n:ss_2$ is the destination module slot location.

INTEGRATED TRUNK MODULE OPERATIONAL SOFTWARE

The LINK/2+ System is shipped with the Integrated Trunk Module operational software already installed in the Integrated Trunk Module(s). In addition, a high density, 3.5-inch floppy disk containing the operational software is also provided.

If a new version of the software is released, perform the following procedure to load the operational software, provided on the floppy disk, from a microcomputer to the Integrated Trunk Module.

Procedure 2-4. Loading Integrated Trunk Module Operational Software

1. Determine the supervisory port parameters for use in configuring the microcomputer by entering the DSP SP command. Record these parameters:

- SPEED: for example, 9600 bps
- STOP: 1 stop bit (required setting)
- DATA: 8 data bits, no parity (required setting)

If the STOP and DATA parameters do not match the required settings, enter the DEF SP command to change the supervisory port parameters to the required settings.

2. Connect the serial port of the microcomputer to the supervisory port of the LINK/2+ System. The microcomputer should have the following:

- High-density 3.5-inch floppy disk drive
- Serial port
- Communications application software containing XMODEM with CRC file transfer protocol (compatible with ProComm Plus 2.01)

3. Using the parameters recorded in step 1 for the supervisory port, configure the microcomputer communications application software for the same parameters.

4. Verify that the communications application is running correctly by entering a supervisory port command such as DSP TIM.

5. Verify (on the disk label) that the version of the operational software is correct prior to loading and record the filename.

6. Insert the operational software disk into the microcomputer.

PRECAUTION: ***Before logically removing the online Integrated Trunk Module, notify all users that all channels are being taken offline or data will be lost.***

7. Logically remove the online Integrated Trunk Module using the RMV n:ss command.

8. Replace the operational software in the flash EPROM with the new operational software by entering:

LOA SW n:ss (or LOA SW n:ss/F)

NOTE: *If the terminal emulation program running on the microcomputer supports a speed of 57600 bps, you can use the optional /F modifier with the LOA SW command to download the operational software at a speed of 57600 bps to the Integrated Trunk Module.*

You do not need to reconfigure the SP port speed to 57600 bps when using the /F modifier as the Network Module automatically switches the SP port to this speed. However, you do need to reconfigure the emulation program speed to 57600 bps.

The following message is displayed:

CONNECT SP PORT TO PC AND INVOKE XMODEM PROTOCOL.

NOTE: *To abort the LOA SW command, enter CONTROL C. If the file transfer has been started, press ESC to abort the file transfer.*

C's appear on the screen until the file transfer is started.

9. Set the file transfer protocol on the microcomputer to XMODEM to send the file from the microcomputer to the LINK/2+ System. Enter the path and filename recorded from the disk label.

If successful, the load process takes about 5 minutes (at 9600 bps). The following message is displayed:

LOAD COMPLETE. INSERT AND WAIT FOR 90 SECONDS TO PROGRAM FLASH.

NOTE: *Immediately after the operational software has been loaded, the lights on the Integrated Trunk Module will cycle on and off a few times while the flash is being programmed. After the lights remain off, proceed to the next step.*

10. Logically insert the Integrated Trunk Module using the INS n:ss command. The ON LINE indicator should light indicating that this Integrated Trunk Module is now online.

If the ON LINE indicator does not light, use the DSP PPN n:ss command to verify that the new RP part number is displayed. If the correct part number is displayed, use the RST n:ss command to reset the Integrated Trunk Module.

11. If a redundant pair of Integrated Trunk Modules exists and if the new operational software is to be loaded onto the offline Integrated Trunk Module, proceed as follows:

A. Logically remove the offline Integrated Trunk Module using the RMV n:ss command.

B. Copy the new version of operational software from the online Integrated Trunk Module to the offline module by entering the following command:

COP SW $n:ss_1$ $n:ss_2$

where $n:ss_1$ is the source module slot location and $n:ss_2$ is the destination module slot location.

Depending on the slot numbers, the following message is displayed:

COPYING SW FROM SLOT 1:05 TO SLOT 1:06.

If successful, the copy process takes about 30 seconds. The following message is displayed:

LOAD COMPLETE. INSERT AND WAIT FOR 90 SECONDS TO PROGRAM FLASH.

NOTE: *Immediately after the operational software has been loaded, the lights on the Integrated Trunk Module will cycle on and off a few times while the flash is being programmed. After the lights remain off, proceed to the next step.*

C. Logically insert the offline Integrated Trunk Module using the INS n:ss command.

Use the DSP PPN n:ss command to verify that the new RP part number is displayed.

12. To copy the operational software to another Integrated Trunk Module in the Control Mainframe, repeat step 11A through 11C. Note that the source module must always be online and the destination module must first be logically removed.

X.50 SERVER MODULE OPERATIONAL SOFTWARE

The LINK/2+ System is shipped with the X.50 Server Module operational software already installed in the X.50 Server Module(s). In addition, a high density, 3.5-inch floppy disk containing the operational software is also provided.

If a new version of the software is released, perform the following procedure to load the operational software, provided on the floppy disk, from a microcomputer to the X.50 Server Module.

Procedure 2-5. Loading X.50 Server Module Operational Software

NOTE: *If an existing X.50 Server Module in the node already contains the current software, you can copy the current software to another X.50 Server Module using the COP SW command. See Procedure 2-6.*

1. Determine the supervisory port parameters for use in configuring the microcomputer by entering the DSP SP command. Record these parameters:

- SPEED: for example, 9600 bps
- STOP: 1 stop bit (required setting)
- DATA: 8 data bits, no parity (required setting)

If the STOP and DATA parameters do not match the required settings, enter the DEF SP command to change the supervisory port parameters to the required settings.

2. Connect the serial port of the microcomputer to the supervisory port of the LINK/2+ System. The microcomputer should have the following:

- High-density 3.5-inch floppy disk drive

- Serial port
- Communications application software containing XMODEM with CRC file transfer protocol (compatible with ProComm Plus 2.01)

3. Using the parameters recorded in step 1 for the supervisory port, configure the microcomputer communications application software for the same parameters.

4. Verify that the communications application is running correctly by entering a supervisory port command such as DSP TIM.

5. Verify (on the disk label) that the version of the operational software is correct prior to loading and record the filename.

6. Insert the operational software disk into the microcomputer.

PRECAUTION: ***Before logically removing an online X.50 Server Module, notify all users that all channels are being taken offline or data will be lost.***

7. Logically remove the X.50 Server Module using the RMV n:ss command.

8. Replace the operational software in the flash EPROM with the new operational software by entering:

LOA SW n:ss (or LOA SW n:ss/F)

NOTE: *If the terminal emulation program running on the microcomputer supports a speed of 57600 bps, you can use the optional /F modifier with the LOA SW command to download the operational software at a speed of 57600 bps to the X.50 Server Module.*

You do not need to reconfigure the SP port speed to 57600 bps when using the /F modifier because the Network Module automatically switches the SP port to this speed. However, you do need to reconfigure the emulation program speed to 57600 bps.

The following message is displayed:

CONNECT SP PORT TO PC AND INVOKE XMODEM PROTOCOL.

NOTE: *To abort the LOA SW command, enter CONTROL C. If the file transfer has been started, press ESC to abort the file transfer.*

C's appear on the screen until the file transfer is started.

9. Set the file transfer protocol on the microcomputer to XMODEM to send the file from the microcomputer to the LINK/2+ System. Enter the path and filename recorded from the disk label.

If successful, the load process takes about 5 minutes (at 9600 bps). The following message is displayed:

LOAD COMPLETE. INSERT AND WAIT FOR 90 SECONDS TO PROGRAM FLASH.

10. Logically insert the X.50 Server Module using the INS n:ss command. If the X.50 Server Module was originally online, the ON LINE indicator should light indicating that this X.50 Server Module is once again online.

If the ON LINE indicator does not light, use the DSP PPN n:ss command to verify that the new RP part number is displayed. If the correct part number is displayed, use the RST n:ss command to reset the X.50 Server Module.

Procedure 2-6. Copying X.50 Server Module Operational Software

To copy the current operational software from one X.50 Server Module (source) to another X.50 Server Module (destination) in the node, proceed as follows:

PRECAUTION: ***Before logically removing an online X.50 Server Module, notify all users that all channels are being taken offline or data will be lost.***

1. Logically remove the destination X.50 Server Module using the RMV n:ss command.

2. Copy the new version of operational software from the source X.50 Server Module to the destination X.50 Server module by entering the following command:

COP SW n:ss_1 n:ss_2

where n:ss_1 is the source module slot location and n:ss_2 is the destination module slot location.

Depending on the slot numbers, the following message is displayed:

COPYING SW FROM SLOT 1:08 TO SLOT 2:06.

If successful, the copy process takes about 30 seconds. The following message is displayed:

LOAD COMPLETE. INSERT AND WAIT FOR 90 SECONDS TO PROGRAM FLASH.

3. Logically insert the destination X.50 Server Module using the INS n:ss command.

Use the DSP PPN n:ss command to verify that the new RP part number is displayed.

VSM.3/VSM.5 VOICE SERVER MODULE OPERATIONAL SOFTWARE

The LINK/2+ System is shipped with the VSM.3 and VSM.5 Voice Server Module operational software already installed in the VSM.3 and VSM.5 Voice Server Modules. In addition, a high-density, 3.5-inch floppy disk containing the operational software is also provided.

If a new version of the software is released, perform the following procedure to load the operational software, provided on the floppy disk, from a microcomputer to the VSM.3 or VSM.5 Voice Server Module.

Procedure 2-7. Loading VSM.3 or VSM.5 Voice Server Module Operational Software

NOTE: *If an existingVSM.3 or VSM.5 Voice Server Module in the node already contains the current software, you can copy the current software to another VSM.3 or VSM.5Voice Server Module respectively, using the COP SW command. See Procedure 2-8.*

1. Determine the supervisory port parameters for use in configuring the microcomputer by entering the DSP SP command. Record these parameters:

- SPEED: for example, 9600 bps
- STOP: 1 stop bit (required setting)
- DATA: 8 data bits, no parity (required settings)

If the STOP and DATA parameters do not match the required settings, enter the DEF SP command to change the supervisory port parameters to the required settings.

2. Connect the serial port of the microcomputer to the supervisory port of the LINK/2+ System. The microcomputer should have the following:

- High-density, 3.5-inch floppy disk drive
- Serial port
- Communications application software containing XMODEM with CRC file transfer protocol (compatible with ProComm Plus 2.01)

3. Using the parameters recorded in step 1 for the supervisory port, configure the microcomputer communications application software for the same parameters.

4. Verify that the communications application is running correctly by entering a supervisory port command such as DSP TIM.

5. Verify (on the disk label) that the version of the operational software is correct prior to loading and record the filename.

6. Insert the operational software disk into the microcomputer.

PRECAUTION: ***Before logically removing an online VSM.3 or VSM.5 Voice Server Module, notify all users that all channels are being taken offline or voice/fax traffic will be lost.***

7. Logically remove the VSM.3 or VMS.5 Voice Server Module using the RMV n:ss command.

8. Replace the current operational software in the VSM.3 or VSM.5 Voice Server Module with the new operational software by entering:

LOA SW n:ss (or LOA SW n:ss/F)

NOTE: *If the terminal emulation program running on the microcomputer supports a speed of 57600 bps, you can use the optional /F modifier with the LOA SW command to download the operational software at a speed of 57600 bps to the VSM.3 or VSM.5 Voice Server Module.*

You do not need to reconfigure the SP port speed to 57600 bps when using the /F modifier because the Network Module automatically switches the SP port to this speed. However, you do need to reconfigure the emulation program speed to 57600 bps.

The following message is displayed:

CONNECT SP PORT TO PC AND INVOKE XMODEM PROTOCOL.

NOTE: *To abort the LOA SW command, enter CONTROL C. If the file transfer has been started, press ESC to abort the file transfer.*

C's appear on the screen until the file transfer is started.

9. Set the file transfer protocol on the microcomputer to XMODEM to send the file from the microcomputer to the LINK/2+ System. Enter the path and file name recorded from the disk label.

If successful, the load process takes about 5 minutes (at 9600 bps). The following message is displayed:

LOAD COMPLETE. MODULE READY TO GO ONLINE.

10. Logically insert the VSM.3 or VSM.5 Voice Server Module using the INS n:ss command. If the VSM.3 or VSM.5 Voice Server Module was originally online, the ON LINE indicator should light indicating that this Voice Server Module is once again online.

After the module comes back online, use the DSP PPN n:ss command to verify that the new software number is displayed.

Procedure 2-8. Copying VSM.3 or VSM.5 Voice Server Module Operational Software

To copy the current operational software from one VSM.3 Voice Server Module (source) to another VSM.3 Voice Server Module (destination) or from one VSM.5 Voice Server Module (source) to another VSM.5 Voice Server Module (destination) in the node, proceed as follows:

PRECAUTION: ***Before logically removing an online VSM.3 or VSM.5 Voice Server Module, notify all users that all channels are being taken offline or voice/fax traffic will be lost.***

1. Logically remove the source VSM.3 or VSM.5 Voice Server Module using the RMV n:ss command.

2. Logically remove the destination VSM.3 or VSM.5 Voice Server Module using the RMV n:ss command.

3. Copy the new version of operational software from the source VSM.3 Voice Server Module to the destination VSM.3 Voice Server Module or from the source VSM.5 Voice Server Module to the destination VSM.5 Voice Server Module by entering the following command:

   COP SW n:ss_1 n:ss_2

   where n:ss_1 is the source module slot location and n:ss_2 is the destination module slot location.

   Depending on the slot numbers, the following message is displayed:

   COPYING SW FROM SLOT 1:08 TO SLOT 2:06.

   If successful, the copy process takes about 50 seconds. The following message is displayed:

   LOAD COMPLETE. MODULE READY TO GO ONLINE.

4. Logically insert the source VSM.3 or VSM.5 Voice Server Module using the INS n:ss command.

5. Logically insert the destination VSM.3 or VSM.5 Voice Server Module using the INS n:ss command.

   Use the DSP PPN n:ss command to verify that the new RP part number is displayed.

SYSTEM CONFIGURATION

For information on configuring the LINK/2+ System, see the Configuration Planning Manual. After the system has been configured, refer to the following paragraphs for information on backing up the configured database.

DATABASE BACKUP

After system configuration has been completed, perform Procedure 2-9 to back up the database via file transfer to a microcomputer hard disk drive or floppy disk. Periodically perform database backups after changes have been made to the system configuration.

Procedure 2-9. Database Backup

1. Determine the supervisory port parameters for use in configuring the microcomputer to match the supervisory port by entering the DSP SP command. Record these parameters:

   - SPEED: for example, 9600 bps
   - STOP: for example, 1 stop bit (required setting)
   - DATA: for example, 8 data bits, no parity (required setting)

If the STOP and DATA parameters do not match the required settings, enter the DEF SP command to change the supervisory port parameters to the required settings.

2. Connect the serial port of the microcomputer to the supervisory port of the LINK/2+ System. The microcomputer should have the following:

- High-density 5.25-inch floppy disk drive, high-density 3.5-inch floppy disk drive, or hard disk drive
- Serial port
- Communications application software containing XMODEM with CRC file transfer protocol (compatible with ProComm Plus 2.01)
- CHECKDB.EXE program (provided with LINK/2+ operational software floppy disk package)

3. Using the parameters recorded in step 1 for the supervisory port, configure the microcomputer communications application software for the same parameters.

4. Verify that the communications application is running correctly by entering a supervisory port command such as DSP TIM.

5. Issue the DSP CKS command and record the displayed checksum and the time and date of the last database change for future reference. (The purpose of this step is for comparison of the stored database with the contents of the Network Module database.)

6. If the database is to be backed up to a floppy disk, insert the disk.

7. Back up the database from the Network Module to the microcomputer by entering:

SAV DB

The following message is displayed:

CONNECT SP PORT TO PC AND INVOKE XMODEM PROTOCOL

NOTE: *To abort the SAV DB command, enter CONTROL C. If the file transfer has been started, press ESC to abort the file transfer.*

8. Set the file transfer protocol on the microcomputer to XMODEM for the microcomputer to receive the file from the Network Module. Enter an appropriate filename to distinguish the version of the database being backed up.

9. At the DOS prompt, verify that the database backup was successful by entering:

CHECKDB *filename*

This program will provide the following information, Figure 2-1:

- Database filename selected by the user
- Node ID
- Database checksum and validated checksum

- Timestamp with time the last database change was made
- Datestamp with date the last database change was made

```
ascomTimeplex LINK/2 NCL Database Verification Program RP50001A

Filename      Node  Checksum  Validated  Timestamp  Datestamp

N4_12-21.8AM  0004     57        57      07:54:42   12/21/93

N4_12-31.8AM  0004     75        75      15:16:42   12/30/93
```

Figure 2-1. Typical Database Verification Program Results

OPENING AND CLOSING MAINFRAME DOOR

WARNING: ***KEEP MAINFRAME DOOR LOCKED DURING NORMAL OPERATION. VOLTAGES WITHIN THE MAINFRAME COULD PRESENT A SHOCK HAZARD.***

The 18-slot and 13-slot (miniLINK/2+) Mainframe front doors have a handle located on the left side for opening and closing the door.

To open the 6-slot (microLINK/2+) Mainframe front door, unlock the key at the bottom of the door and pull door slightly forward at the base. Lift door off frame.

To close the microLINK/2+ Mainframe front door, position the door on the top of the frame, then push the bottom of the door toward the back of the unit until the door snaps into place. Lock the door.

Chapter 3

General Information

The supervisory port allows network control, monitoring, diagnostics, information retrieval, and configuration activities for the LINK/2+ System to be conducted from a supervisory terminal. Supervisory port commands can be directed to the local LINK/2+ System and to remote LINK/2+ and LINK/1 Systems in the network. Commands can also be directed to LINK Channel Service Unit Systems (LINK/CSU) connected to any node in the network.

Command format and supervisory port operational guidelines are described in this chapter. Commands are discussed in the following chapters:

- **Support Commands,** Chapter 4, discusses supervisory port operational commands and command files.
- **Display Commands,** Chapter 5, describes the commands that provide status, statistical, and configuration information.
- **Configuration Commands,** Chapter 6, describes the commands used to configure the LINK/2+ System. This chapter also includes guidelines for performing configuration activities and typical configuration procedures.
- **Diagnostic Commands,** Chapter 7, describes the commands that allow the user to test channels, intermachine links, modules, and alarm relays.

For a summary of all supervisory port messages, see Appendix A.

For information on accessing the supervisory port, see Chapter 2, Getting Started.

COMMAND FORMAT

The supervisory port command format is shown in Figure 3-1.

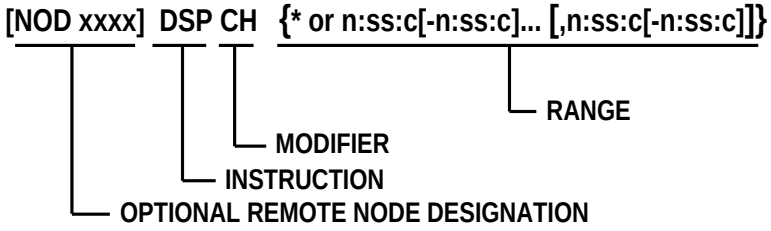


Figure 3-1. Supervisory Port Command Format

Figure 3-2 shows a typical command which displays channel parameters for the following I/O channels at remote node 12:

- Channel 4 in slot 11 of the Control Mainframe (nest 1)
- Channels 3 and 4 in slot 9 of Expander A Mainframe (nest 2)
- Channels 1 through 3 in slot 5 of Expander B Mainframe (nest 3)
- Channel 2 in slot 6 through channel 4 in slot 10 of Expander B Mainframe (nest 3)

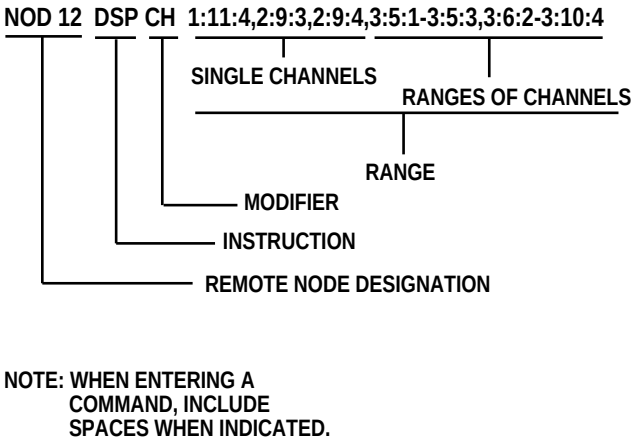


Figure 3-2. Typical Command

The following symbols are used in this User's Guide to designate selections of nodes, Mainframes, slots, and channels in the range part of a command:

c	=	I/O channel number (1-4)
cc	=	DS-0 channel number (1-31), X.50 DS-0 channel number (1-16), VSM/VSM.1 channel number (1-31), VSM.3A channel number (1-8), VSM.3B channel number (1-16), or VSM.5 channel number (1-12)
ccc	=	bypass channel number (1-511)
n	=	Mainframe (nest) number, 1=Control Mainframe; 2=Expander A Mainframe (upper); 3=Expander B Mainframe (lower)
sr	=	X.50 subrate channel (1 to 20)
ss	=	slot number (1-18)
xxxx	=	node number (1-2000)
*	=	all elements in a range. Can also be used to specify all channels on a module, e.g., n:ss:*
{ }	=	required parameter. Choose one of the elements within the braces. Braces are never entered as part of the command.
[ ]	=	optional parameter. Brackets are never entered as part of the command.

A semicolon (;) can be entered in place of a colon (:) when entering nest:slot:channel numbers.

A command line can have a maximum of 80 characters. Commands directed to a remote node can have a maximum of 50 characters.

Structure of Commands

Command structure consists of:

- Optional remote node designation
- Instruction
- Modifier
- Range

The **optional remote node designation** lets you direct a command to a specific remote node. If a command is to be executed at the local node, the local node number is not required.

NOTE: *See the "Issuing Remote Commands" paragraphs for information on issuing remote commands in expanded networks.*

The **instruction** is a 2- or 3-character abbreviation, for example, DEF for DEFINE and CLR for CLEAR. The instruction part of the command is always required.

The **modifier** follows the instruction and specifies:

- A particular physical part of the LINK/2+ System, e.g.:
  - CH = channel
  - DL = intermachine link
  - SP = supervisory port
- A particular action, e.g.:
  - PG = pagination
  - CON = connection
  - PR = priority

Some commands require only one modifier. For example, the command:

```
SET PG
```

where: SET = instruction
PG = modifier

sets pagination on the supervisory terminal.

Other commands require two or three modifiers. For example, the command:

```
DEF CFB 1 SC1
```

where: DEF = instruction
CFB 1 SC1 = modifiers

defines station clock 1 as the primary clock source on the system clock fallback list.

The **range** part of the command further specifies the device on which the command is to be executed. The following paragraphs describe how ranges are specified.

Specifying a Node

When a command specifies a node, the range can include any combination of:

xxxx	=	a single node
xxxx,xxxx	=	multiple nodes
xxxx-xxxx	=	a range of nodes in ascending order
*	=	all nodes. This selection must be entered alone.

For example, to display the routing parameters for nodes 2, 3, and 100 to 111, the command is:

DSP RTE 2,3, 100-111

where: DSP = instruction
RTE = modifier
2,3, 100-111 = range

Specifying a Module

When a command specifies a module, the Mainframe (nest) and slot number are both required. The range can include any combination of:

n:ss	=	a single slot
n:ss,n:ss	=	multiple slots
n:ss-n:ss	=	a range of slots in ascending order
*	=	all slots. This selection must be entered alone.

For example, to logically insert a module in slot 4 of Expander A Mainframe (nest 2), the command is:

INS 2:4

where: INS = instruction
2:4 = range

Specifying an Intermachine Link

When a command specifies an intermachine link, only the slot number where the Interlink Module is located is required. The range can include any combination of:

ss	=	a single intermachine link
ss,ss	=	multiple intermachine links
ss-ss	=	a range of intermachine links in ascending order
*	=	all intermachine links. This selection must be entered alone.

For example, to display the intermachine link parameters for the Interlink Modules in slots 11 and 13, the command is:

```
DSP DL 11, 13
```

where:	DSP	=	instruction
	DL	=	modifier
	11, 13	=	range

Specifying a Channel

When a command specifies a channel, the Mainframe (nest), slot, and channel number are required. Depending on the command, the channel number could be:

n:ss:c	=	I/O channel number (1-4)
n:ss:cc	=	DS-0 channel number (1-31), X.50 DS-0 channel number (1-16) VSM/VSM.1 channel number (1-31), VSM.3A channel number (1-8), VSM.3B channel number (1-16), or VSM.5 channel number (1-12)
n:ss:ccc	=	bypass channel number (1-511)

The range can include any combination of:

n:ss:c	=	a single channel
n:ss:c,n:ss:c	=	multiple channels
n:ss:c-n:ss:c	=	a range of channels in ascending order
n:ss:*	=	all channels on module in specified slot
*	=	all channels. This selection must be entered alone.

For example, to display channel parameters for channel 4 on the I/O module in slot 5 of Expander B Mainframe (nest 3), the command is:

```
DSP CH 3:5:4
```

where: DSP = instruction
CH = modifier
3:5:4 = range

To display channel parameters for all channels on the I/O modules in slots 10, 11, and 12 of the Control Mainframe (nest 1), the command is:

```
DSP CH 1:10:1-1:12:4
```

where: DSP = instruction
CH = modifier
1:10:1-1:12:4 = range

Specifying an X.50 Subrate Channel

When a command specifies an X.50 subrate channel, the Mainframe (nest), slot, X.50 DS-0 (X.50 aggregate) channel, and the X.50 subrate channel number (1-20) are required.

The range can include any combination of:

n:ss:cc:sr	=	a single X.50 subrate channel
n:ss:cc:sr,n:ss:cc:sr	=	multiple X.50 subrate channels
n:ss:cc:sr-n:ss:cc:sr	=	a range of X.50 subrate channels in ascending order
n:ss:cc:*	=	all X.50 subrate channels in an X.50 DS-0 channel on module in specified slot

For example, to display the channel parameters for X.50 subrate channels 7 to 12 on X.50 DS-0 channel 8 of the XSM Module in slot 17 of the Control Mainframe (nest 1), the command is:

```
DSP XCH 1:17:8:7-1:17:8:12
```

where: DSP = instruction
XCH = modifier
1:17:8:7-1:17:8:12 = range

To display the channel parameters for all X.50 subrate channels on X.50 DS-0 channel 10 of the XSM Module in slot 12 of the Control Mainframe (nest 1), the command is:

```
DSP XCH 1:12:10:*
```

where: DSP = instruction
XCH = modifier
1:12:10:* = range

SUPERVISORY PORT OPERATIONAL GUIDELINES

The supervisory port recognizes several supervisory terminal control key editing functions which are used to support all phases of supervisory port operation; see Table 4-1 in Chapter 4, Support Commands.

The following paragraphs explain how to enter commands, issue remote commands, issue external port (LINK/CSU) commands, and make menu selections.

Entering Commands from Supervisory Terminal

Use the following procedure to enter commands from the supervisory terminal:

1. Ensure supervisory port prompt (Nxxxx>) is displayed. (xxxx is the local node number.) If the prompt is not displayed, enter Control C character.
LINK/2+ System displays supervisory port prompt.

2. Type complete command at the supervisory port prompt.
If you make a typing error, backspace by using the Backspace or DEL key or entering Control H character(s), type the correct character(s), and then enter Control A or Control F character to move cursor to the end of the command line.

3. Press RETURN key to enter the command.

- If the command was entered incorrectly:
  - A question mark is displayed in lieu of the supervisory port prompt.
  - An up arrow points to the error.

  Press the RETURN key and reenter the command.

- If the command was entered correctly:
  - Command is executed.
  - Response, if any, is displayed.
  - Supervisory port prompt is displayed.

Issuing Remote Commands

NOTE: *In the command summary tables throughout this User's Guide, a # in the "N" column indicates that a command can be issued to a remote node.*

All commands entered through the supervisory port are directed to the local node unless the command is preceded with the remote node designation, NOD xxxx.

NOTES: *A remote command will NOT be executed if any of the following conditions exist:*

- *If the **local** node number entered is invalid, the message "ILLEGAL SOURCE NODE" is displayed.*
- *If the command is directed to an undefined node, a question mark is displayed and an up arrow points to the error. Press the RETURN key to return to the supervisory port prompt.*
- *If a route between the local and remote nodes has not been defined, the command is aborted. See "Define and Clear Routing Table (DEF RTE, CLR RTE) Commands" and "Define and Clear Subnetwork Routing Table (DEF SRT, CLR SRT) Commands" paragraphs in Chapter 6, Configuration Commands.*
- *If a nonglobal gateway command is issued to another node in the same network and the remote node does not have the originator node number on its alarm notification list, the command is aborted.*
- *If an intermachine link has failed, routing tables to a remote node are incorrect, intermachine link security is enabled, or an inbound intermachine link along the route is defined for TRANSLATE=FULL or TRANSLATE=NO BYPASS, the message "NO ACKNOWLEDGE" is displayed. The local LINK/2+ System will retry the command every 30 seconds. To abort the command immediately, enter Control C character or press BREAK key. Intermachine links at a node defined with TRANSLATE=NO BYPASS will not block messages terminating at that node.*
- *If a command is issued to a node more than seven bypass hops from the source node, or a response to a command cannot locate the source node due to erroneous routing, the local LINK/2+ System will retry the command every 30 seconds. After 4 minutes, the retransmissions will stop and the message "NO RESPONSE - CMD ABORTED" is displayed. To abort the command before the 4 minutes have elapsed, enter Control C character or press BREAK key.*
- *In a network with nodes that have different firmware levels, some commands may not be recognized by the older nodes. If a remote node does not recognize a command, a question mark is displayed at the local supervisory terminal. Press RETURN key to return to the supervisory port prompt.*

Issuing External Port (LINK/CSU) Commands

A LINK/2+ supervisory terminal can issue commands to a LINK/CSU connected to any LINK/2+ System in the network. The LINK/CSU command must be preceded by **EP**. For example, the following command is issued to the LINK/CSU at the local node:

```
EP D L 5
```

where: EP = external port prefix
D L 5 = LINK/CSU command

To issue a command to a LINK/CSU connected to a remote node, precede the entire command with the remote node designation, NOD xxx. For example, the following command is issued to the LINK/CSU at node 50:

NOD 50 EP D L 5

where:

NOD 50 = remote node designation
EP = external port prefix
D L 5 = LINK/CSU command

For information on LINK/CSU commands, see the LINK/CSU User's Guide.

NOTE: *The Network Module DIP switch K1-1 must be set to ON/CLOSED before the EP commands are accepted.*

Making Menu Selections

For most commands used to define parameters, the supervisory terminal displays a menu from which parameter values are selected. To select parameter values from a menu:

1. Enter complete command. System displays first line of current values. The cursor is immediately to the right of the first parameter value, Figure 3-3.

2. Press the F key to scroll forward or press the B key to scroll backward through the parameter values until the desired value is displayed.

3. Press the SPACE bar to select the displayed value and move the cursor to the next parameter value. Repeat steps 2 and 3 until all parameters on a line are selected.

4. At the end of a line, press the SPACE bar to return to the first parameter value on the line if further changes are required to the parameters on the current line.

5. After all the changes on a line are selected, press RETURN key to move to the next display line.

6. To enter values in the LINK/2+ System after all parameter values on the menu are selected, press the RETURN key while the cursor is on the last display line of the menu.

NOTE: *When a command that displays a menu is entered with a **range** of channels or slots, the parameter values of the lowest channel or intermachine link are displayed.*

The parameter values of the displayed channel are assigned to all channels in the range that are on the same type of module. The parameter values of the displayed intermachine link are assigned to all slots in the range.

For example, Figure 3-3 shows how to change parameter values of a synchronous channel. In the example, channel speed, delay threshold, and phasor size are changed.

ENTRY	DISPLAY	RESULT
DEF CH/ QSC 1:11:2 RETURN	N0100>DEF CH/ QSC 1:11:2 SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS. 9600_ 1 02 04 ORIG OUTBAND	DEF CH COMMAND IS ENTERED. FIRST LINE OF CHANNEL 1:11:2 PARAMETER VALUES IS DISPLAYED.
F KEY (5 TIMES)	N0100>DEF CH/ QSC 1:11:2 SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS. 6000_ 1 02 04 ORIG OUTBAND	SPEED PARAMETER VALUES SCROLL FORWARD UNTIL 6000 IS DISPLAYED.
SPACE BAR (3 TIMES)	N0100>DEF CH/ QSC 1:11:2 SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS. 6000 1 02 04_ ORIG OUTBAND	CURSOR ADVANCES TO THE DELAY THRESHOLD PARAMETER VALUE.
B KEY (2 TIMES)	N0100>DEF CH/ QSC 1:11:2 SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS. 6000 1 02 02_ ORIG OUTBAND	DELAY THRESHOLD PARAMETER VALUE SCROLLS BACKWARD UNTIL 02 IS DISPLAYED.
RETURN	N0100>DEF CH/ QSC 1:11:2 SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS. 6000 1 02 02 ORIG OUTBAND TYPE PHRESET PHASOR OOS OPER CTSGEN CTSDELAY DCE_ MX DO NOTHING TRANS	SECOND LINE OF PARAMETER VALUES IS DISPLAYED.
SPACE BAR (1 TIME) THEN F KEY (1 TIME)	N0100>DEF CH/ QSC 1:11:2 SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS. 6000 1 02 02 ORIG OUTBAND TYPE PHRESET PHASOR OOS OPER CTSGEN CTSDELAY DCE 06_ DO NOTHING TRANS	CURSOR ADVANCES TO PHASOR SIZE PARAMETER. (CURSOR SKIPS PHRESET PARAMETER BECAUSE TYPE SELECTED IS DCE.) PHASOR PARAMETER VALUE SCROLLS TO 06.
RETURN	N0100>DEF CH/ QSC 1:11:2 SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS. 6000 1 02 02 ORIG OUTBAND TYPE PHRESET PHASOR OOS OPER CTSGEN CTSDELAY DCE 06 DO NOTHING TRANS CTN. TYPE B/W.FNS. B/W_ F1,-F1	THIRD LINE OF PARAMETER VALUES IS DISPLAYED.
RETURN	N0100>DEF CH/ QSC 1:11:2 SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS. 6000 1 02 02 ORIG OUTBAND TYPE PHRESET PHASOR OOS OPER CTSGEN CTSDELAY DCE 06 DO NOTHING TRANS CTN. TYPE B/W.FNS. B/W F1,-F1 N0100>_	PARAMETER VALUES ARE ENTERED. SUPERVISORY PORT PROMPT IS DISPLAYED.

Figure 3-3. Typical Parameter Programming Using Menu Selections

Chapter 4

Support Commands

Supervisory port support commands allow you to:

- Load or copy operational software
- Backup and restore configuration database
- Toggle operational software between banks of memory
- Enable or disable password protection on the supervisory port
- Set or clear supervisory port pagination
- Set the time and date
- Display or inhibit the display of unsolicited messages
- Display a list of supervisory port commands
- Set up command files

The supervisory port also recognizes several supervisory terminal control key editing functions, which are used to support all phases of supervisory port operations.

Table 4-1 lists support commands and control key editing functions in alphabetical order by command mnemonic and key name.

SUPPORT COMMANDS

Supervisory port support commands are described in the following paragraphs. Commands are in alphabetical order by command mnemonic. Related commands are discussed together.

Commands used for command file applications are described in the "Command File Commands" and "Using Command Files" paragraphs.

Clear (Unmask) Unsolicited Messages (CLR MUM) Command

See "Mask and Unmask Unsolicited Messages (SET MUM, CLR MUM) Commands" paragraph.

Table 4-1. Support Commands

G	N	Command
		B key **Description:** Scrolls backward through a menu.
		BACKSPACE key **Description:** Backspaces to correct typing errors on same line.
		BREAK key **Description:** Cancels command, causes prompt to be displayed, exits repetitive command file command, and halts connect/disconnect messages.
G	#	CLR MUM LOC **Description:** Clears the supervisory port of masking unsolicited messages from local node.
G	#	CLR MUM REM **Description:** Allows the local node to transmit unsolicited alarms to the nodes on alarm notification list of local node.
		CLR PG **Description:** Clears pagination on supervisory terminal.
G	#	CLR PW **Description:** Clears supervisory port of old passwords for password 1 (PW1) and password 2 (PW2), and disables password protection.
G	#	CLR TMO **Description:** Disables 30-minute timer and allows user unlimited time on the supervisory terminal (used only if password protection is enabled).
		CLR @ file **Description:** Clears preset execution time of command file, where *file* is a number between 1 and 8.
		CLS **Description:** Clears screen and moves cursor to upper left-hand corner of screen.
		CONTROL A keys Description: When entered at the prompt, displays last command entered but does not execute the command. Entering Control A when the cursor is within a command line moves the cursor to the end of the command. Entering Control A at the end of a command line will repeat any characters from the previous command that are to the right of the cursor.
		CONTROL B keys **Description:** When repeatedly entered at the prompt, scrolls backward through the last 20 commands executed. Any command can be executed by pressing RETURN key.
		CONTROL C keys **Description:** Same as BREAK key.
		CONTROL D keys **Description:** Displays and executes last command entered.

Table 4-1. Support Commands (Cont'd)

G	N	Command
		CONTROL F keys **Description:** Same as Control A, plus when repeatedly entered at the prompt, scrolls forward through the last 20 commands executed. Any command can be executed by pressing RETURN key.
		CONTROL H keys **Description:** Same as BACKSPACE key.
		CONTROL Q keys **Description:** Enables output of data to terminal (X-ON).
		CONTROL R keys **Description:** Lists the last 20 commands executed.
		CONTROL S keys **Description:** Disables output of data to terminal (X-OFF).
		CONTROL Z keys **Description**: Ends insert mode of command file editor when used in the first position of a line.
G	#	COP SW n:ss n:ss COP SW 1:ss **Description:** In the first command format, copies operational software from the online Network Module, Integrated Trunk Module, or X.50 Server Module to the offline Network Module, Integrated Trunk Module, or X.50 Server Module. In the second command format, copies operational software from the online memory bank to the offline memory bank of the online Network Module.
G	#	DEF PW1 **Description:** Defines new password for password level 1 and enables password protection after both PW1 and PW2 are defined.
G	#	DEF PW2 **Description:** Defines new password for password level 2 and enables password protection.
		DEF @ *file* **Description:** Opens a command file for creating, editing, or deleting with the command file editor, where *file* is a number between 1 and 8.
		DEL key **Description:** Backspaces to correct typing errors on same line.
		DSP @ {* *or* d[-d]...[,d[-d]]} **Description:** Displays contents of command file(s).
		ESC key **Description:** Ends insert mode of command file editor when used in the first position of a line.
		EX **Description:** Exits or logs out user from LINK/2+ System, preventing unauthorized user access via the supervisory terminal.

Table 4-1. Support Commands (Cont'd)

G	N	Command
		F key **Description:** Scrolls forward through a menu.
	#	HELP **Description:** Lists available LINK/2+ System supervisory port commands.
		HOME **Description:** Moves cursor to upper left-hand corner of screen without clearing screen.
G		LOA DB[/F] **Description:** Downloads previously stored configuration parameters (database) to the online Network Module from a microcomputer connected to the supervisory port. Optional /F modifier causes database to be downloaded at speed of 57.6 kbps.
G		LOA SW n:ss[/F] **Description:** Loads operational software from a microcomputer to a Network Module, Integrated Trunk Module, or X.50 Server Module. Optional /F modifier causes operational software to be downloaded at speed of 57.6 kbps.
		RETURN key **Description:** Enters command or moves to next line of parameters.
G		SAV DB[/F] **Description:** Uploads the Network Module database (configuration parameters) from the Network Module to a microcomputer connected to the supervisory port. Optional /F modifier causes database to be uploaded at speed of 57.6 kbps.
G	#	SET DAT mm-dd-yyyy **Description:** Sets month-day-year of real-time clock.
G	#	SET MUM LOC **Description:** Causes the supervisory port to mask unsolicited messages from the local node.
G	#	SET MUM REM **Description:** Causes the local node to not transmit unsolicited alarms to the nodes on alarm notification list of local node.
		SET PG **Description:** Sets pagination on supervisory terminal.
G	#	SET TIM tt:tt:tt [/OFF=±hh:mm] **Description:** Sets time of day in hours:minutes:seconds and initializes real-time clock. Optional /OFF modifier permits introducing a plus or minus offset in hours:minutes for network management alarm time-stamping purposes.
G	#	SET TMO **Description:** Enables 30-minute timer to log out user if no keystroke is made for 30 minutes (used only if password protection is enabled).
		SPACE bar **Description:** Advances cursor from one parameter to the next on a line of a menu. When pagination is set, advances to the next screen.

Table 4-1. Support Commands (Cont'd)

G	N	Command
		STP **Description:** Stops currently executing command file from continuing. No commands following STP command will execute.
G	#	TGL BNK n:ss **Description:** Switches execution of operational software between two independent banks of flash EPROM that are part of a Network Module.
	#	" **Description:** Sends text message, up to 48 characters, to supervisory port of specified remote node.
	#	? **Description:** Displays keyword information for available LINK/2+ System supervisory port commands.
		@ *file* [/tt:tt:tt] @ *file* [/tt:tt:tt mm-dd-yyyy] @ *file* [/mm-dd-yyyy tt:tt:tt] @ *file* [/mm-dd-yyyy] **Description:** Executes command file specified, where *file* is a number from 1-8. If a time and/or date is entered as part of the command, the command file is executed at the time specified.
FOR COMMAND FILES ONLY		
		BACKSPACE key **Description:** Repositions cursor for editing command lines after using E command.
		CONTROL C **Description:** Exits the command file editor without saving the current changes.
		CONTROL Z **Description:** Ends insert mode of command file editor when used in the first position of a line.
		D {i *or* i-j} **Description:** Deletes line i or lines i through j of a command file after the file has been opened with the DEF @ command, where i and j are line numbers.
		E {i} **Description:** Places cursor at end of line i of a command file for editing after the file has been opened with the DEF @ command, where i is a line number. The backspace key is used to reposition the cursor.
		ESC key **Description:** Ends insert mode of command file editor when used in the first position of a line.
		I [i] **Description:** Allows the insertion of new lines into a command file after the file has been opened with the DEF @ command, where i is 0 or a line number. If no line number or 0 is used, new lines are inserted before the first line. If a line number is used, new lines are inserted after the specified line.

Table 4-1. Support Commands (Cont'd)

G	N	Command
		RETURN key **Description:** Moves cursor to next line of command file when used at the end of a line. Ends insert mode of editor when used in the first position of a line.
		X **Description:** Saves the current command file, as edited, and exits the command file editor.
		*tt:tt:tt **Description:** Enters a time delay into a command file. The LINK/2+ System waits the specified length of time before executing the next command in the command file.
		&$x_1 \ldots x_{254}$ **Description:** Enters terminal screen control characters and text into a command file.

G entry in "G" column indicates a nonglobal gateway command.
entry in "N" column indicates that a command can be issued to a remote node by preceding the command with NOD xxxx.

d	=	command file number (1 to 8)
mm-dd-yyyy	=	month-day-year
n	=	nest number: 1 = Control Mainframe; 2 = Expander A Mainframe (upper); 3 = Expander B Mainframe (lower)
ss	=	slot number
tt:tt:tt	=	hour:minute:second (24-hour clock)
$x_1 \ldots x_{254}$	=	up to 254 characters
[ ]	=	optional parameter. Brackets are never entered as part of command.
{ }	=	required parameter. Choose one of the elements within braces. Braces are never entered as part of command
…	=	used before [ ] symbol to indicate command can be entered with several parameter values. Dots are never entered as part of command.

Clear Supervisory Port Pagination (CLR PG) Command

See "Set and Clear Supervisory Port Pagination (SET PG, CLR PG) Commands" paragraph.

Clear Password (CLR PW) Command

See "Define and Clear Password (DEF PW1, DEF PW2, CLR PW) Commands" paragraph.

Clear Time Out (CLR TMO) Command

See "Set and Clear Time Out (SET TMO, CLR TMO) Commands" paragraph.

Clear Screen and Home Cursor (CLS) Command

The CLS command is used to clear the screen and move the cursor to the upper left-hand corner of the screen.

Copy Software (COP SW) Command

The COP SW command is used to copy operational software from the online Network Module, Integrated Trunk Module, or X.50 Server Module to the offline Network Module, Integrated Trunk Module, or X.50 Server Module respectively; or to copy the operational software from the online memory bank to the offline memory bank of the online Network Module. This command can only be issued locally.

The COP SW command is also used to copy operational software from one VSM.3 Voice Server Module to another VSM.3 Voice Server Module, and from one VSM.5 Voice Server Module to another VSM.5 Voice Server Module.

Commands:

[NODxxxx] COP SW n:ss n:ss

where:

first n:ss = nest and slot number of online Network Module, Integrated Trunk Module,or X.50 Server Module that operational software is to be copied **from**
second n:ss = nest and slot number of offline Network Module, Integrated Trunk Module, or X.50 Server Module that operational software is to be copied **to**

NOTE: *For the Integrated Trunk Module and X.50 Server Module, the source module must be defined and online. The destination module must be logically removed prior to issuing the COP SW command and then logically inserted after the copy process completes.*

For the VSM.3 and VSM.5 Voice Server Modules, both the source and destination modules must be logically removed prior to issuing the COP SW command and then logically inserted after the copy process completes.

[NODxxxx] COP SW 1:ss

where:

1:ss = slot number of online Network Module. This command copies the operational software from the online memory bank to the offline memory bank.

Define and Clear Password (DEF PW1, DEF PW2, CLR PW) Commands

The DEF PW1 and DEF PW2 commands enable password protection. The CLR PW command disables password protection.

Commands:

[NOD xxxx] DEF PW1
[NOD xxxx] DEF PW2
[NOD xxxx] CLR PW

The DEF PW1 and DEF PW2 commands enable password protection and allow the user to define new passwords for password level 1 and password level 2. If the supervisory port is designated as a gateway, password level 2 offers gateway mode, while password level 1 offers nongateway mode.

NOTE: *PW2 can be defined without defining PW1. However, if PW1 is defined, PW2 must also be defined.*

After entering each command, the LINK/2+ System prompts:

ENTER OLD/DEFAULT PASSWORD:

Enter the old password. If the password was not previously defined, enter the default password TIMEPLEX. The LINK/2+ System prompts:

ENTER NEW PASSWORD:

Enter the new password of 4 to 8 ASCII characters. An entry that is invalid causes an invalid message response. After a valid password is entered, the LINK/2+ System prompts for verification of the password:

ENTER AGAIN:

Enter the new password again. If the verification is incorrect, the LINK/2+ System prompts for the new password again.

If password protection is enabled, the DSP ST SY command display includes one of the following messages:

SP USER STATUS = GATEWAY
SP USER STATUS = NONGATEWAY
SP USER STATUS = NOT LOGGED IN

NOTE: *The SP USER STATUS message will not be displayed after passwords are defined, until the user logs off and logs on again.*

The CLR PW command disables password protection and clears the supervisory port of old passwords for password 1 (PW1) **and** password 2 (PW2). After entering the CLR PW command, the LINK/2+ System prompts:

ENTER PASSWORD:

Enter the password for PW2. If the entry is correct, passwords 1 and 2 will be disabled. If password protection is desired, the user must define PW1 and PW2 after clearing passwords.

While defining or clearing passwords, if the user enters the old/default password incorrectly three times, the user will be logged out.

NOTE: *If the user's password does not work or if the user has forgotten the password, password protection can also be disabled with a DIP switch on the Network Module. See the Network Module chapter in the LINK/2+ Installation and Maintenance Manual.*

Log Out (EX) Command

The EX command logs the user out of the LINK/2+ System, preventing unauthorized user access via the supervisory terminal.

Command:

EX

Help (HELP) Command

The HELP command scrolls through the list of available LINK/2+ System supervisory port commands. To view the list of commands, enter the SET PG command, then enter the HELP command. To view more commands, press the SPACE bar.

Command:

[NOD xxxx] HELP

Home Cursor (HOME) Command

The HOME command is used to move the cursor to the upper left-hand corner of the screen **without** clearing the screen.

Load Database (LOA DB) Command

The LOA DB command downloads (restores) previously stored configuration parameters (database) to the online Network Module from a microcomputer connected to the supervisory port. This command can only be issued to a local node (either by directly connecting the microcomputer or by connecting it remotely via modems) and **should only be used for database recovery**.

The microcomputer requires a communications program that supports the XMODEM file transfer protocol using 128 byte data packets and CRC error checking. If needed, see the LINK/2+ Installation and Maintenance Manual appendixes for the database recovery procedure.

Command:

LOA DB[/F]

where:

/F = causes the database to be downloaded at speed of 57.6 kbps.

PRECAUTION: This command will cause the node to reset when the transfer is complete.

After the database has been downloaded, the online Network Module will automatically reset. If a redundant Network Module pair exists, the node will not toggle redundancy.

Load Software (LOA SW) Command

The LOA SW command downloads operational software from a microcomputer to a Network Module, Integrated Trunk Module, X.50 Server Module, or VSM.3 or VSM.5 Voice Server Module. This command can only be issued to a local node (either by directly connecting the microcomputer or by connecting it remotely via modems).

The microcomputer requires a communications program that supports the XMODEM file transfer protocol using 128 byte data packets and CRC error checking. If a new software release needs to be loaded, see the loading operational software procedures in the Getting Started chapter of this User's Guide.

When loading Network Module operational software , this command must always be directed to an online Network Module. When loading operational software to an Integrated Trunk Module, X.50 Server Module, or VSM.3 or VSM.5 Voice Server Module, the module must be logically removed prior to issuing the LOA SW command and then logically inserted after the software has been loaded.

Command:

LOA SW n:ss[/F]

where:

/F = causes operational software to be downloaded at speed of 57.6 kbps.

Save Database (SAV DB) Command

The SAV DB command uploads (saves) the Network Module database (configuration parameters) from the Network Module to a microcomputer. This command can only be issued locally.

The microcomputer requires a communications program that supports the XMODEM file transfer protocol using 128 byte data packets and CRC error checking. See the database backup procedure in the Getting Started chapter of this User's Guide.

NOTE: *The SAV DB command does not include the supervisory port parameters in the backed up database. Prior to issuing the SAV DB command, confirm and record the supervisory port parameters using the DSP SP command.*

Command:

SAV DB[/F]

where:

/F = causes database to be uploaded at speed of 57.6 kbps.

Set Day of Year (SET DAT) Command

The SET DAT command sets the day of the year of the real time clock.

Command:

[NOD xxxx] SET DAT mm-dd-yyyy

where:

mm-dd-yyyy = month-day-year

The response includes the time, the day of the week, and month in literal format.

For example:

```
SET DAT 12-14-1990
TIME: 10:24:30     DATE: FRI DEC-14-1990
```

Mask and Unmask Unsolicited Messages (SET MUM, CLR MUM) Commands

The SET MUM LOC command causes the supervisory port to mask (not to display) unsolicited messages from the local node. The SET MUM REM command causes the local node to inhibit transmission of unsolicited alarms to the nodes on the alarm notification list of the local node.

The CLR MUM LOC command clears the supervisory port of masking unsolicited messages from the local node. The CLR MUM REM command allows the local node to transmit unsolicited alarms to the nodes on the alarm notification list of the local node.

Commands:

[NOD xxxx] SET MUM LOC
[NOD xxxx] SET MUM REM

[NOD xxxx] CLR MUM LOC
[NOD xxxx] CLR MUM REM

Set and Clear Supervisory Port Pagination (SET PG, CLR PG) Commands

The SET PG command causes the supervisory port to output one page (23 lines) of data to the supervisory terminal and then wait for any key (except Control S, Control C, or BREAK) to be pressed before outputting the next page.

The CLR PG command causes the supervisory port to continuously output data to the supervisory terminal.

Commands:

SET PG
CLR PG

Set Time of Day (SET TIM) Command

The SET TIM command sets the time of day and initializes the real time clock. Enter hours, minutes, and seconds separated by colons.

Command:

[NOD xxx] SET TIM tt:tt:tt [/OFF=±hh:mm]

where:	tt:tt:tt	=	hours:minutes:seconds (24-hour clock)
	/OFF=±hh:mm	=	Optional plus or minus offset in hours and minutes (12-hour clock) separated by colons. This offset is used by the Network Management System for alarm time-stamping.

NOTES: *The offset time is expressed as an offset from Greenwich Mean Time (GMT)/Universal Coordinated Time (UCT).*

The LINK/2+ System does not automatically adjust for daylight savings time.

Set and Clear Time Out (SET TMO, CLR TMO) Commands

The SET TMO and CLR TMO commands enable and disable the 30-minute timer that can be used when password protection is enabled.

Commands:

[NOD xxxx] SET TMO
[NOD xxxx] CLR TMO

The SET TMO command enables the 30-minute timer. The user will be logged out if no keystroke is made at the supervisory terminal for 30 minutes.

The CLR TMO command disables the 30-minute timer and allows the user unlimited time on the supervisory terminal until the user manually logs out with the EX command.

If password protection is enabled, the DSP SY command display includes one of the following messages to show if the 30-minute timer is enabled or disabled:

SP TIMEOUT: ENABLED
SP TIMEOUT: DISABLED

Stop Command File Execution (STP) Command

The STP command stops a currently executing command file from continuing, once the system processes the STP command.

No commands, following the STP command, in the command file sequence will execute.

Toggle Bank (TGL BNK) Command

The TGL BNK command is issued to a Network Module. This command switches execution of operational software from the Network Module's current online flash EPROM bank to the current offline flash EPROM bank. For example, if the Network Module is currently executing from the operational software in bank B, it will execute from bank A after the TGL BNK command is executed.

Before switching to the other memory bank, the Network Module performs a checksum on the operational software in the new memory bank, and will only switch after confirming that the software in the new bank is satisfactory.

PRECAUTION: ***The TGL BNK command also resets the Network Module, but the online Network Module remains the online module after resetting.***

Command:

[NOD xxxx] TGL BNK n:ss

Send Message (") Command

The " command sends up to 48 characters of text to the supervisory port of the specified remote node. If the remote node is unable to display the text message for any reason, the " command times out after 14 seconds and displays the message "BUSY" at the local supervisory terminal. The receiving supervisory terminal precedes the output text with an identifier of the sending node.

Command:

NOD xxxx "*text*

where: *text* = up to 48 printable characters.

A quotation mark after the text is not required.

NOTES: *This command does not function if the receiving intermachine link security is enabled.*

The Send Message command can send text only to LINK/2+ Release 7 and higher nodes.

Command Keyword Information (?) Command

The ? command displays keyword information for available LINK/2+ System supervisory port commands, Figure 4-1. Initially, the keywords displayed are the 1-, 2-, or 3-character instruction part of each LINK/2+ command.

Command:

[NOD xxxx] ?

A plus sign (+) following a 2- or 3-character keyword in the display indicates that more information is available. To display more information about that command, enter the keyword abbreviation followed by a ?. Figure 4-1 shows how to use the ? command to find more information about the CLR command.

If the character string ' ' appears in the display, this indicates that no additional keyword is required.

```
N0100>?
?, @, CLR+, CON+, DEF+, DSC+, DSP+, INS, LP+, MON+, NOD, RMV, RST, SET+,
TRC+, TST+, BSY, CEN+, HEL, EP, CNV+, EX, DEL+
N0100>
N0100>CLR ?
@, AQ, BP+, CH, DL, MG, PG, PH, RDN, RLY, RTE, MC, FMC, DS0, DS1, TON, LCL,
MUM+, SEC, PW, TMO, REG, POL, PRO, MM, VPR, SPR
N0100>
N0100>CLR BP ?
LP, PH
```

NOTE: CLR GWY and SET GWY commands do not appear on the screen because these commands can only be issued remotely, e.g., NOD 1234 SET GWY SP.

Figure 4-1. Typical Command Keyword Information (?) Command

COMMAND FILE COMMANDS

Command files allow the user to replace complex commands, or a sequence of commands, with a single macro command that is stored in the database. The following paragraphs describe the commands for defining, displaying, editing, executing, and clearing command files.

Delete Command Lines (D) Command

The D command deletes a specified line or range of lines in a command file when the supervisory terminal is in command file edit mode.

Command at the CMD? prompt:

D {i or i-j}

where: i = number of command line to be deleted
i-j = range of command line numbers for lines to be deleted, where i $\leq$ j.

Define/Clear Command File (DEF @) Command

The DEF @ command opens a new or existing command file for editing and displays the command file editor prompt for edit commands. Up to eight separate command files can be defined. Each command file can contain a maximum of 254 characters (including spaces and carriage returns). Each command file is given a unique 1-digit identifier from 1 to 8.

The edit commands available through the DEF @ command are also used to clear a command file.

Command:

DEF @ *file*

where: *file* = specified command file (a number from 1 to 8)

The following guidelines apply when defining command files:

- If more than 254 characters are entered in a command file, the message "Out of Space" is displayed when the editor is exited. Redefine the command file. See "Linking Command Files" paragraph to program a command file of more than 254 characters.
- A LINK/2+ System can be programmed to execute a command file repeatedly. See "Repeating Command Files" paragraph.
- Two special supervisory port commands are available only for use within a command file. See "Terminal Control and Banner Command" and "Delay Time Command" paragraphs.
- If the Copy Software (COP SW) command follows the Remove Module (RMV) command in a command file, use the Delay Time (*) command to include at least a 5 second delay preceding the COP SW command.

To define a new command file:

1. At the supervisory port prompt, enter the DEF @ command with the number of the command file to be defined. The system displays the command file number followed by the command file editor prompt (CMD?) to indicate the LINK/2+ System is in the command file edit mode.

2. At the CMD? prompt, type I and press the RETURN key. The system displays a 1 for the first line.

3. Type a supervisory port command followed by the RETURN key. The system displays the number for the next line and places the cursor in the first position of the new line.

4. Repeat step 3 until all commands for the command file have been entered.

5. In the first position of the next line, press the RETURN key to exit insert mode and return to the CMD? prompt. (Instead of the RETURN key, you can also use the ESCAPE key or CONTROL Z.) The system displays the number of the command file and all the lines of the file followed by the CMD? prompt.

6. Type X followed by the RETURN key to save the file and exit to the supervisory port prompt. To exit without saving the file or any changes, type CONTROL C.

For example, to create command file 1 consisting of the DSP ST SY and DSP SY commands, use these steps:

1. At the supervisory port prompt, enter DEF @ 1 to display:

   VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(X)IT

   Command File #1

   CMD? _

2. Enter I to be prompted with the first line number.

3. Enter DSP ST SY to display:

   ```
   1 DSP ST SY
   2 _
   ```

4. Enter DSP SY to display:

   ```
   1 DSP ST SY
   2 DSP SY
   3 _
   ```

5. Press the RETURN key to display:

   ```
   Command File #1
     1 DSP ST SY
     2 DSP SY

   CMD? _
   ```

6. Enter X to save the file and display the supervisory port prompt.

To edit a command file:

1. At the supervisory port prompt, enter the DEF @ command with the number of the file to be edited. The system displays the command file number and the complete file followed by the command file editor prompt (CMD?) to indicate the LINK/2+ System is in the command file edit mode.

2. To edit a line of the file, enter E and the number of the line to display the line with the cursor positioned at the end of the line.

3. Use the BACKSPACE key to move the cursor to the first character to be changed and type over the existing characters to make the changes. Press the RETURN key to display the edited file followed by the CMD? prompt.

4. To delete one or more lines of the file, enter D and the number of the line or the range of lines to be deleted. The system displays the edited file followed by the CMD? prompt.

5. To insert lines into the file, enter I and the number of the line just before the insertion point. Use I 0 or I without any line number to insert lines at the beginning of the file before line 1. The system displays the next line number so the new lines can be inserted.

6. Type the supervisory port command to be inserted and press the RETURN key at the end of the line to display the next line number.

7. Repeat step 6 as many times as required to insert the new lines.

8. In the first position of the next line, press the RETURN key to exit insert mode. (Instead of the RETURN key, you can also use the ESCAPE key or CONTROL Z.) The system displays the number of the command file and all the lines of the file followed by the CMD? prompt.

9. Type X followed by the RETURN key to save the edited file and exit to the supervisory port prompt. To exit without saving the file or any changes, type CONTROL C.

For example, to edit command file 1 of the previous example:

1. Enter DEF @ 1 to display:

```
VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(X)IT

Command File #1
   1 DSP ST SY
   2 DSP SY

CMD? _
```

2. To edit the first line, enter E 1 to display:

```
   1 DSP ST SY_
```

3. Backspace to the beginning of SY, type QUA * and press the RETURN key to complete the edit and display:

```
Command File #1
   1 DSP ST QUA *
   2 DSP SY

CMD? _
```

4. To begin inserting lines after line 1, enter I 1 to display:

```
   2 _
```

5. Enter command lines such as:

```
   2 DSP AQ
   3 DSP ST ALM 26
   4 _
```

6. Press the RETURN key to exit insert mode, reassign line numbers, and display:

```
Command File #1
   1 DSP ST QUA *
   2 DSP AQ
   3 DSP ST ALM 26
   4 DSP SY

CMD? _
```

7. To delete line 2, enter D 2 to display:

```
Command File #1
   1 DSP ST QUA *
   2 DSP ST ALM 26
   3 DSP SY

CMD? _
```

8. Enter X to save the edited file and display the supervisory port prompt.

To clear a command file:

1. At the supervisory port prompt, enter the DEF @ command with the number of the command file to be cleared. The system displays the command file number and the complete file followed by the command file editor prompt (CMD?).

2. Type D 1-N followed by the RETURN key, where N is the number of the last line in the file. The system deletes all lines of the file and displays just the command file number followed by the CMD? prompt.

3. Type X followed by the RETURN key to exit to the supervisory prompt.

For example, to clear the command file of the previous example:

1. Enter DEF @ 1 to display:

VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(X)IT

Command File #1
1 DSP ST QUA *
2 DSP ST ALM 26
3 DSP SY

CMD? _

2. Enter D 1-3 to delete all lines and display:

Command File #1

CMD? _

3. Enter X to return to the supervisory port prompt.

Display Command File (DSP @) Command

The DSP @ command displays the contents of a command file.

Command:

DSP @ **{*** *or* d[-d]...**[**,d[-d]**]}**

where: d = command file number (1 to 8)

NOTE: *Range of command file numbers must be in ascending order.*

For example, to display command file 1, enter DSP @ 1. The supervisory terminal will then display the individual commands that comprise command file 1, Figure 4-2.

```
N0100>DSP @ 1
Command File #1
DSP ST SY
DSP SY
```

Figure 4-2. Typical Command File Display (DSP @)

Edit Command Lines (E) Command

The E command displays a specified line for editing in a command file when the supervisory terminal is in command file edit mode. The E command places the cursor at the end of the displayed line, and the BACKSPACE key can be used to position the cursor for overtyping the characters to be changed.

Command at the CMD? prompt:

E {i}

where: i = number of command line to be edited

Insert Command Lines (I) Command

The I command allows the insertion of new lines into a command file when the supervisory terminal is in command file edit mode. The I command displays the line number of the first new line followed by the cursor. After the new line is typed followed by the RETURN key, the system displays the next line number and cursor for additional lines.

Command at the CMD? prompt:

I [i]

where: i = number of command line just before the insertion point

If 0 or no line number is used, the new line is inserted before the current line 1 of the file.

Exit Command File Editor (X) Command

The X command exits the command file editor and returns the supervisory prompt to the screen.

Command at the CMD? prompt:

X

Execute Command File (@) Command

The @ command executes a command file. **Command files can be executed either manually or automatically at a specified time of day.** The individual commands that were entered into the specified command file via the DEF @ command are executed one at a time in the order in which the commands were originally entered.

Commands:

@ *file* [/tt:tt:tt]
@ *file* [/tt:tt:tt mm-dd-yyyy]
@ *file* [/mm-dd-yyyy tt:tt:tt]
@ *file* [/mm-dd-yyyy]

where:
- *file* = specified command file (a number from 1 to 8)
- tt:tt:tt = (optional) time in hours:minutes:seconds when the command file is to be executed (24-hour clock)
- tt:tt:tt mm-dd-yyyy = (optional) time in hours:minutes:seconds and date as month-day-year when the command file is to be executed
- mm-dd-yyyy tt:tt:tt = (optional) date as month-day-year and time in hours:minutes:seconds when the command file is to be executed

mm-dd-yyyy = (optional) date as month-day-year when the command file is to be executed

If the @ command is entered without the time modifier, the command file is executed only once (upon entry).

Time of Day Execution

If the time modifier, i.e., tt:tt:tt, is included in the @ command, the specified command file is executed once every 24 hours, at the time specified, until the time is cleared using the CLR @ command.

Time and Date Execution

If the time and date modifier is included in the @ command, the specified command file is executed once on the time and date specified.

Date Execution

If the date modifier is included in the @ command, the specified command file is executed on the date specified, at the time the command file was entered.

For example, to program the LINK/2+ System to execute command file 2 at 5:00 P.M. every day, enter:

```
@ 2/17:00:00
```

where: @ = instruction
2 = specifies command file 2
17:00:00 = sets execution time for 5 P.M.

Clear Preset Time (CLR @) Command

The CLR @ command clears the time that the LINK/2+ System is programmed to automatically execute a command file.

Command:

CLR @ *file*

where: *file* = specified command file (a number from 1 to 8)

Only the **time** that the LINK/2+ System is programmed to execute the command file is cleared from the database, not the command file itself.

NOTE: *A reset to a nonredundant Network Module or loss of power to the LINK/2+ System also clears the time at which a command file will automatically be executed.*

For example, to clear the preset time from command file 2, enter:

```
CLR @ 2
```

where:

CLR @ = instruction
2 = specifies command file 2

USING COMMAND FILES

The following paragraphs describe how to use command files more efficiently by linking command files, repeating a command file, and using the special commands that can only be used as instructions within a command file.

Linking Command Files

To enter a sequence of commands containing more than 254 characters, command files can be linked together. Enter the @ command as the final command in the current command file and specify the identification number of the command file to which you wish to link.

For example, Figure 4-3 shows how command file 5 is programmed so that the last instruction, i.e., @ 6, executes command file 6.

```
N0100> DEF @ 5
VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(X)IT
Command File #5
  1 DEF DST CH 1:8:*/N2 C1:10:*
  2 NOD 2 DEF DST CH 1:10:*/N1 C1:8:8
  3 DSC CH 1:9:11:9
  4 @ 6
CMD? X
```

Figure 4-3. Typical Programming to Link Command Files

Repeating Command Files

To program a LINK/2+ System to execute a specified command file repeatedly, enter the @ command as the final command in the current command file and specify the identification number of the current command file.

To stop execution of a repeating command file, press BREAK key or enter Control C character.

For example, Figure 4-4 shows how to program the LINK/2+ System to repeatedly execute command file 4, which displays intermachine link status of the Interlink Module in slot 11.

```
N0100> DEF @ 4
VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(X)IT
Command File #4
  1 DSP ST DL 11
  2 @ 4
CMD? X
```

Figure 4-4. Typical Programming to Repeat Command File

Delay Time (*) Command

The Delay Time (*) command is used to enter a time delay within a command file. After a * command is executed, the system waits the amount of time specified by the * command before executing the next command in the file.

Command:

*tt:tt:tt

where: tt:tt:tt = time in hours:minutes:seconds (24-hour clock)

For example, Figure 4-5 shows a command file that displays intermachine link status for the Interlink Module in slot 11 every 15 seconds.

NOTE: *The Delay Time command is a special supervisory port command that can only be entered as an instruction within a command file.*

```
N0100> DEF @ 4
VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(X)IT
Command File #4
  1 DSP ST DL 11
  2 *00:00:15
  3 @ 4
CMD? X
```

Figure 4-5. Typical Use of Delay Time Command

Terminal Control and Banner (&) Command

The & command is used to enter terminal screen control characters and text into a line of a command file. Typically, the control characters are used to clear the screen and position text that is used as a banner while a command file is being executed.

Command:

$\&x_1 \ldots x_{254}$

where:

$x_1 \ldots x_{254}$ = up to 254 terminal screen control characters and alphanumeric characters that can be typed in a command file

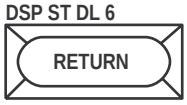
To enter a terminal screen control character (e.g., home, clear, or cursor forward), press the appropriate key on the keyboard or enter the sequence of special characters specified by your terminal user's manual. When the & key is entered as the first character on a line in a command file:

- The terminal echoes the control characters and text on the screen as they are entered.
- The terminal screen control functions are executed and text is displayed on the screen when the command file is executed.

For example, Figure 4-6 shows a typical example of how to program the LINK/2+ System to clear the supervisory terminal screen, return the cursor to the home position, and display the banner "DISPLAYING DATA LINK STATISTICS" each time command file 4 is executed.

All the key entries that follow the & command are displayed when the DSP @ command is entered, including terminal control character sequences, Figure 4-7.

NOTE: *The Terminal Control and Banner command is a special supervisory port command that can only be entered as an instruction within a command file.*

ACTION	ENTRY	DISPLAY	RESULT
ENTER COMMAND FILE EDIT MODE AND SELECT COMMAND FILE 4.	DEF @ 4	N0100>DEF @ 4 VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(XIT) Command File #4 CMD? _	CMD? PROMPT IS DISPLAYED INDICATING YOU ARE IN COMMAND FILE EDIT MODE.
TO DEFINE TERMINAL CONTROL AND BANNER FOR RUN TIME:		N0100>DEF @ 4 VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(XIT) Command File #4 CMD? I 1 _	CURSOR MOVES TO THE FIRST LINE OF FILE.
• GO TO INSERT MODE	I		
• TYPE TERMINAL CONTROL AND BANNER COMMAND.	&	N0100>DEF @ 4 VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(X)IT Command File #4 CMD? I 1 &_	
• TYPE TERMINAL CONTROL SEQUENCE TO MOVE CURSOR TO HOME POSITION.	A ◊	N0100>DEF @ 4 VALID COMMANDS ARE: DELETE, EDIT, INSERT, E(X)IT Command File #4 CMD? I 1 &	CURSOR MOVES TO UPPER LEFT-HAND CORNER OF SCREEN (HOME POSITION).
• TYPE TERMINAL CONTROL SEQUENCE TO CLEAR TERMINAL SCREEN.	K ◊	_	SUPERVISORY TERMINAL SCREEN GOES BLANK.
• DEFINE BANNER WHICH WILL BE DISPLAYED ON SUPERVISORY TERMINAL AT RUN TIME.	DISPLAYING DATA LINK STATISTICS	DISPLAYING DATA LINK STATISTICS 2_	TERMINAL CONTROL SEQUENCE AND BANNER ARE ENTERED INTO COMMAND FILE. CURSOR MOVES TO THE BEGINNING OF NEXT LINE.
ENTER DSP ST DL COMMAND FOR INTERLINK MODULE IN SLOT 6 INTO COMMAND FILE.	DSP ST DL 6 	DISPLAYING DATA LINK STATISTICS 2DSP ST DL 6 3_	CURSOR MOVES TO THE BEGINNING OF NEXT LINE.
ENTER COMMAND TO WAIT 15 SECONDS BEFORE EXECUTING THE NEXT COMMAND IN THE COMMAND FILE.	*00:00:15	DISPLAYING DATA LINK STATISTICS 2DSP ST DL 6 3*00:00:15 4_	CURSOR MOVES TO THE BEGINNING OF NEXT LINE.

◊ = Control sequence is terminal dependent.

Figure 4-6. Typical Use of Terminal Control and Banner (&) Command (Sheet 1 of 2)

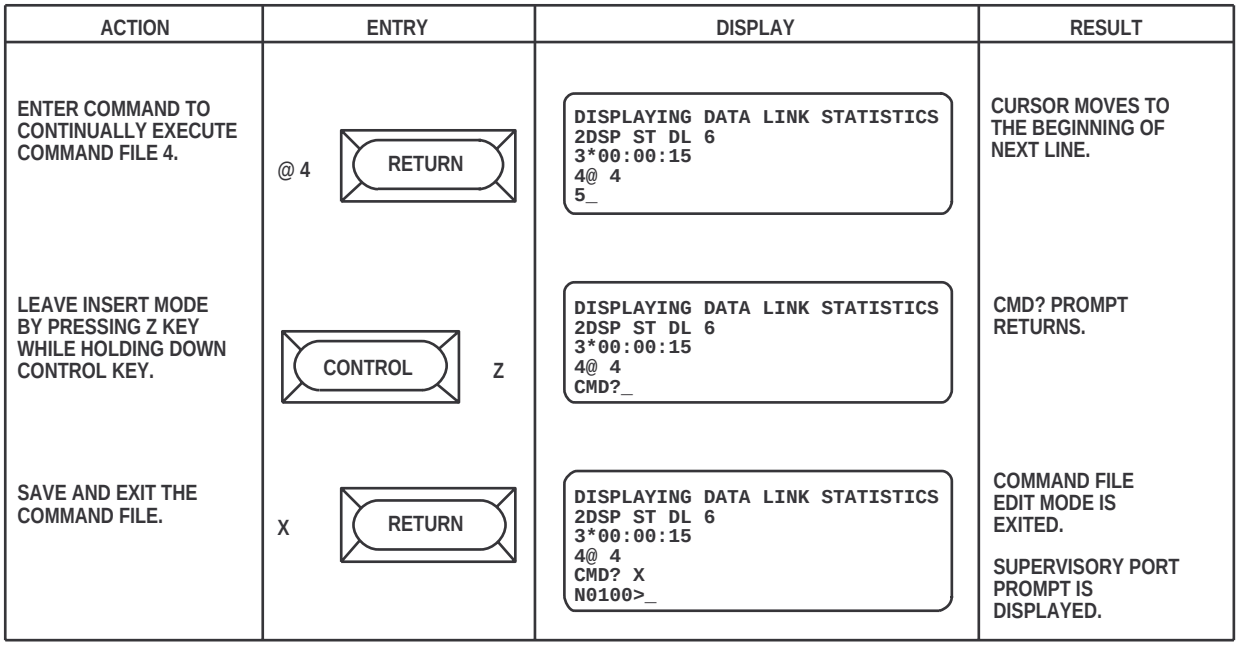


Figure 4-6. Typical Use of Terminal Control and Banner (&) Command (Sheet 2)

```
N0100>DSP @ 4

Command File #4

& ^A^[kDISPLAYING DATA LINK STATISTICS

DSP ST DL 6

@ 4
```

Figure 4-7. Typical Display of Command File with Terminal Control Character Sequences and Banner

Chapter 5

Display Commands

Supervisory port display commands provide status, statistical, and configuration information for local and remote nodes. The status information is related to:

- Alarms
- Database checksum
- System bus bandwidth
- EIA control functions
- Start-up errors
- Clock errors
- Modules
- DS-1 and DS-0 signaling
- Channels
- Connections
- Destinations
- Broadcast/polling groups
- Intermachine links
- Integrated trunk bundles
- Nodes
- X.50 DS-0 channels and X.50 subrate channels

The statistical information is related to:

- Intermachine links
- Integrated trunk bundles
- DS-1 interface quality performance
- Internal message generator partial test

The configuration information is related to:

- I/O and DS-0 channel parameters
- DS-1 and quality parameters
- Bundle configurations
- Intermachine link parameters
- Integrated trunk parameters
- D-channel parameters
- Routing parameters
- Supervisory port, supervisory computer port, and external port parameters
- System parameters
- PROM part numbers and module revisions
- ABM profiles, speed profiles, and voice profiles
- ISDN or Switched 56K dial-up services and phone numbers
- X.50 DS-0 channel parameters and X.50 subrate channel parameters

Commands that display parameters retrieve information only from the online Network Module database.

Table 5-1 lists the display commands in alphabetical order by command mnemonic.

Table 5-1. Display Commands

N	Command
#	CLR AQ **Description:** Clears alarm table and displays alarms currently in effect.
#	CLR TAQ **Description:** Clears time-stamped alarm list.
#	DSP ACT POL n:ss:c **Description:** For local node, continuously displays the active group member of the specified broadcast/polling group until any key is pressed. For remote node, takes instantaneous status to display the current active group member.
#	DSP AQ[/C] **Description:** Displays contents of alarm table. Optional /C modifier clears alarm list after system displays alarms.
#	DSP BDL NPR {* *or* 1:ss:cc[-1:ss:cc]... [,1:ss:cc[-1:ss:cc]]} **Description:** Displays nonproprietary bundle parameters for Integrated Trunk Module(s) specified.
#	DSP BDL PR {* *or* 1:ss:cc[-1:ss:cc]... [,1:ss:cc[-1:ss:cc]]} **Description:** Displays proprietary bundle parameters for Integrated Trunk Module(s) specified.
#	DSP BW **Description:** Displays system bus bandwidth currently defined for Interlink Module(s), Integrated Trunk Module(s), and the local connections of Voice Server Module(s), Voice Processor(s), Channelized Services Processor(s), and X.50 Server Module(s).
#	DSP CFG {* *or* 1:ss[-1:ss]...[,1:ss[-1:ss]]}[/M] **Description:** Displays the current bundle configuration for all the DS-0 channels of the specified Channelized Services Processor or Integrated Trunk Module. Optional /M modifier displays the master channel, speed, size, and members of the bundle. For Integrated Trunk Module, /M modifier also displays ARQ bandwidth.
#	DSP CH {* *or* n:ss:c[-n:ss:c]... [,n:ss:c[-n:ss:c]]} **Description:** Displays parameters of I/O channel(s) specified.
#	DSP CKS **Description:** Displays database checksum value and status and the time and date of the last change made to the database.
#	DSP CON {* *or* n:ss:c[-n:ss:c]... [,n:ss:c[-n:ss:c]]}[/Pppp] **Description:** Displays destination channel and connect status of specified I/O channels. Same as DSP DST CH command. Optional /P modifier displays information only for channels with specified ABM profile.
#	DSP CP **Description:** Displays supervisory computer port parameters.
#	DSP CSP {* *or* 1:ss[-1:ss]...[,1:ss[-1:ss]]} **Description:** Displays DS-1 parameters for Channelized Services Processor(s) in specified slot(s).
#	DSP DCM {* *or* n:ss[-n:ss]... [,n:ss[-n:ss]]} **Description:** Displays ISDN D-channel parameters for D-Channel Module(s) specified.

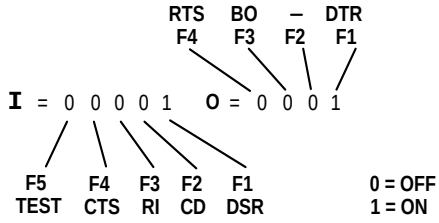
Table 5-1. Display Commands (Cont'd)

N	Command
#	DSP DL {* *or* ss[-ss]... [,ss[-ss]]} **Description:** Displays intermachine link parameters for intermachine link(s) specified.
#	DSP DS0 {* *or* n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]} **Description:** Displays parameters for specified Voice Processor DS-0 channel(s).
#	DSP DS1 {* *or* n:ss[-n:ss]... [,n:ss[-n:ss]]} **Description:** Displays DS-1 parameters for Voice Processor(s) in specified slot(s).
#	DSP DST {* *or* n:ss:c[-n:ss:c] … [,n:ss:c[-n:ss:c]] *or* n:ss:cc[-n:ss:cc] … [,n:ss:cc[-n:ss:cc]] *or* n:ss:cc:sr[-n:ss:cc:sr]... [,n:ss:cc:sr[-n:ss:cc:sr]]}[/Pppp] **Description:** Displays destination channel and connect status of all data and analog voice I/O channels, all digital voice DS-0 channels, all X.50 DS-0 channels, and all X.50 subrate channels at a node. Optional /P modifier displays information only for channels with specified ABM profile.
#	DSP DST CH {* *or* n:ss:c[-n:ss:c] … [,n:ss:c[-n:ss:c]]}[/Pppp] **Description:** Displays destination channel and connect status of specified I/O channels. Same as DSP CON command. Optional /P modifier displays information only for channels with specified ABM profile.
#	DSP DST DL {ss *or* 1:ss:cc} [Nxxxx n:ss:c[-n:ss:c]] DSP DST DL {ss *or* 1:ss:cc} [Nxxxx n:ss:cc[-n:ss:cc]] DSP DST DL {ss *or* 1:ss:cc} [Nxxxx n:ss:cc:sr[-n:ss:cc:sr]] **Description:** Displays destination channel and connect status of all channel connections on the specified intermachine link or the specified proprietary bundle. Optionally displays information only for specified node and I/O channels, DS-0 or X.50 DS-0 channels, or X.50 subrate channels.
#	DSP DST DS0 {* *or* n:ss:cc[-n:ss:cc] … [,n:ss:cc[-n:ss:cc]]}[/Pppp] **Description:** Displays destination channel and connect status of specified DS-0 channels or bundles. Optional /P modifier displays information only for channels with specified ABM profile.
#	DSP DST XCH {* *or* n:ss:cc:sr[-n:ss:cc:sr]... [,n:ss:cc:sr[-n:ss:cc:sr]]}[/Pppp] **Description:** Displays destination channel and connect status of specified X.50 subrate channels. Optional /P modifier displays information only for channels with specified ABM profile.
#	DSP DST XS0 {* *or* n:ss:cc[-n:ss:cc] … [,n:ss:cc[-n:ss:cc]]}[/Pppp] **Description:** Displays destination channel and connect status of specified X.50 DS-0 channels. Optional /P modifier displays information only for channels with specified ABM profile.
#	DSP EP **Description:** Displays the current parameter values of the external port that interfaces the LINK/2+ System to the LINK/CSU.
#	DSP ERR **Description:** Displays errors that occurred on start-up or reset for Network Module, Interlink Module(s), Integrated Trunk Module(s), D-Channel Module(s), Dual Isochronous Module(s), Isochronous Communication Module(s), Voice Server Module(s), Enhanced Voice Module(s), Foreign Exchange Office Module(s), Foreign Exchange Station Module(s), Quad Asynchronous Module(s), Channelized Services Processor(s), Voice Processor(s), and X.50 Server Module(s).

Table 5-1. Display Commands (Cont'd)

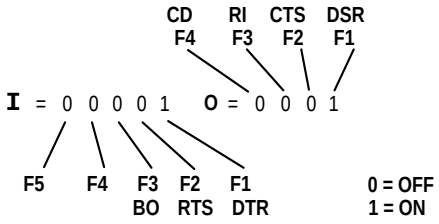
N	Command
#	DSP FN n:ss:c **Description:** For local end of channel, continuously displays EIA functions/control signals of I/O channel specified until any key is pressed. For remote end, displays instantaneous EIA functions/control signals.

DCE FUNCTION DISPLAY



	(I=) EIA INPUT TO LINK/2+ SYSTEM FROM DCE	(O=) EIA OUTPUT FROM LINK/2+ SYSTEM TO DCE
F5	Test	
F4	Clear-to-send (CTS) signal. For channel using 64 kbps Bipolar Interface Module, alarm indication signal (AIS). May toggle under data pass conditions. A steady 0 indicates AIS condition.	Request-to-send (RTS) signal
F3	Ring indicator (RI) signal. For analog voice channel, M lead from local PBX. For Quad Synchronous Processor channel in LPDA mode, test indicator (TI) signal. For Dual Isochronous Module channel, 1 indicates local channel is operating properly, 0 indicates a problem. For channel using 64 kbps Bipolar Interface Module, loss of sync (LOS) signal.	Out-of-service (BO) signal. For analog voice channel, E lead to local PBX. For Quad Synchronous Processor channel in LPDA mode, test mode (TM) signal. For Dual Isochronous Module channel, 1 indicates remote channel is operating properly, 0 indicates a problem.
F2	Data carrier detect (CD) signal	Not applicable: 1 or 0 displayed
F1	Data set ready (DSR) signal. For channel using 64 kbps Bipolar Interface Module, not applicable. 1 is displayed.	Data terminal ready (DTR) signal

DTE FUNCTION DISPLAY



	(I=) EIA INPUT TO LINK/2+ SYSTEM FROM DTE	(O=) EIA OUTPUT FROM LINK/2+ SYSTEM TO DTE
F5	Not applicable: 1 or 0 displayed	
F4	Not applicable: 1 or 0 displayed	Data carrier detect (CD) signal
F3	Busy out (BO) signal. For Quad Synchronous Processor channel in LPDA mode, test mode (TM) signal. For Dual Isochronous Module channel, 1 indicates local channel is operating properly, 0 indicates a problem.	Ring indicator (RI) signal. For Quad Synchronous Processor channel in LPDA mode, test indicator (TI) signal. For Dual Isochronous Module channel, 1 indicates remote channel is operating properly, 0 indicates a problem.
F2	Request-to-send (RTS) signal	Clear-to-send (CTS) signal
F1	Data terminal ready (DTR) signal	Data set ready (DSR) signal

Table 5-1. Display Commands (Cont'd)

N	Command
#	DSP HIS[*option*] **Description:** Displays alarm history for the last 10 alarm 32 DS-0 dial-up connection failures. *Option* is one of the following: /C = clears the alarm history /A = displays the entire alarm history buffer (up to 255 errors) /K = clears the buffer without displaying the alarms
#	DSP ILQ {* *or* 1:ss[-1:ss]…[,1:ss[-1:ss]]} **Description:** Displays DS-1 parameters for Integrated Trunk Module(s) specified.
#	DSP LFM {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Displays model type and current parameters for LFM.3, LFM.10, LFM.11, LFM.12, or LFM.14 Link Framing Module(s) specified.
#	DSP MAP {* *or* n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]} **Description:** Displays X.50 subrate channel database time slot assignments for the specified X.50 DS-0 channel(s) of an X.50 Server Module.
#	DSP MDS0 {* *or* 1:ss:cc[-1:ss:cc] …[,1:ss:cc[-1:ss:cc]]} **Description:** Displays the current parameter values for the specified master DS-0 channel(s) of a Channelized Services Processor.
#	DSP PHN BCK 1:ss **Description:** Displays ISDN or Switched 56K phone number directories used for link backup for Interlink Module or Integrated Trunk Module specified.
#	DSP PHN XDL 1:ss **Description:** Displays ISDN or Switched 56K phone number directories used for link expansion or dial link for Integrated Trunk Module specified.
#	DSP POL {* *or* n:ss:c[-n:ss:c] …[,n:ss:c[-n:ss:c]]}[/A] **Description:** Displays the connect status and master channel of the specified broadcast/polling group member(s). Optional /A modifier displays the connect status of all members in the broadcast/polling group of the specified master channel.
#	DSP PPN {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Displays PROM part numbers for Network Module, Interlink Module, Integrated Trunk Module, D-Channel Module, Channelized Services Processor, Voice Processor, Quad Asynchronous Module, Isochronous Communication Module, Voice Server Module, Enhanced Voice Module, Foreign Exchange Office Module, Foreign Exchange Station Module, Dual Isochronous Module, and X.50 Server Module in slot locations specified.
#	DSP PRO {* *or* ppp[-ppp]…[,ppp[-ppp]]}[/D] DSP PRO/D **Description:** Displays ABM profile parameters for the specified ABM profile(s) and/or the default profile (/D).
#	DSP QUA {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Displays parameters defined for performance monitoring of the Voice Processor(s) or Channelized Services Processor(s) specified.

Table 5-1. Display Commands (Cont'd)

N	Command
#	DSP REV {* *or* n:ss} **Description:** Displays the contents of the module revision PROM for the Network Module, Integrated Trunk Module, D-Channel Module, Isochronous Communication Module, Voice Server Module, Enhanced Voice Module, Foreign Exchange Office Module, Foreign Exchange Station Module, Voice Processor, Channelized Services Processor, and X.50 Server Module.
#	DSP RTE {* *or* xxxx[-xxxx] …[,xxxx[-xxxx]]} **Description:** Displays the current routing parameter values to node(s) specified.
#	DSP SIG DS0 n:ss:cc **Description:** Continuously displays the signaling of the specified Voice Processor, Channelized Services Processor, or Integrated Trunk Module DS-0 channel.
#	DSP SIG EQ {* *or* n:ss[-n:ss]...[,n:ss[-n:ss]]} **Description:** Displays the current state of the signals received from the DS-1 interface for all DS-0 channels of the Voice Processor(s), Channelized Services Processor(s), or Integrated Trunk Modules(s) specified.
#	DSP SIG LI {* *or* n:ss[-n:ss]...[,n:ss[-n:ss]]} **Description:** Displays the current state of the signals sent to the DS-1 interface for all DS-0 channels of the Voice Processor(s), Channelized Services Processor(s), or Integrated Trunk Module(s) specified.
#	DSP SP **Description:** Displays supervisory port parameters.
#	DSP SPR {* *or* sp[-sp]...[,sp[-sp]]} **Description:** Displays the defined Isochronous Communication Module speed(s) for the specified profile number.
#	DSP ST ALM 1[/C] **Description:** Displays nest and slot numbers for modules that were inserted/removed. Optional /C modifier clears alarm 1 history.
#	DSP ST ALM 2[/C] **Description:** Displays nest and slot number for modules that have start-up hardware errors. Optional /C modifier clears alarm 2 history.
#	DSP ST ALM 6[/C] **Description:** Displays Interlink Module slot numbers and Integrated Trunk Module slot and bundle numbers for the intermachine links that are declared in-service. Optional /C modifier clears alarm 6 history.
#	DSP ST ALM 7[/C] **Description:** Displays Interlink Module slot numbers and Integrated Trunk Module slot and bundle numbers for the intermachine links that are declared out-of-service. Optional /C modifier clears alarm 7 history.

Table 5-1. Display Commands (Cont'd)

N	Command
#	DSP ST ALM 9[/C] **Description:** Displays nest and slot numbers for modules that have database/hardware conflicts. Optional /C modifier clears alarm 9 history.
#	DSP ST ALM 10[/C] **Description:** Displays nest and slot numbers for modules that have not responded to the Network Module. Network Module nest and slot numbers are displayed if an invalid node number has been defined. Optional /C modifier clears alarm 10 history.
#	DSP ST ALM 12[/C] **Description:** Displays nest, slot, and channel numbers for channels or DS-0s that have failed initial connection attempts. Optional /C modifier clears alarm 12 history.
#	DSP ST ALM 15[/C] **Description:** Displays alarm status of all Voice Processors at the node. Optional /C modifier clears the alarm after alarm is displayed.
#	DSP ST ALM 21[/C] **Description:** Displays alarm status of all Channelized Services Processors and Integrated Trunk Modules at the node. Optional /C modifier clears the alarm after alarm is displayed.
#	DSP ST ALM 24[/C] **Description:** Displays BER information for intermachine links and integrated trunk bundles whose BER fell below the error performance alarm threshold specified in the intermachine link parameters or in the integrated trunk bundle parameters. Optional /C modifier clears the alarm history.
#	DSP ST ALM 25[/C] **Description:** Displays BER information for intermachine links and integrated trunk bundles whose BER met or exceeded the error performance alarm threshold specified in the intermachine link parameters or in the integrated trunk bundle parameters. (Alarm 25 occurs only after Alarm 24.) Optional /C modifier clears the alarm history.
#	DSP ST ALM 26[/C] **Description:** Displays the channel disconnects that resulted from error performance violations. Optional /C modifier clears the alarm history.
#	DSP ST ALM 27[/C] **Description:** Displays the channel disconnects caused by bumping. Optional /C modifier clears the alarm history.
#	DSP ST ALM 33[/C] **Description:** Displays out-of-service status for the X.50 DS-0 channels of an X.50 Server Module. Optional /C modifier clears the alarm history.
#	DSP ST BDL {* *or* 1:ss:cc[-1:ss:cc] …[,1:ss:cc[-1:ss:cc]]}[*option*] **Description:** Displays status of specified integrated trunk bundle(s). *Option* is one of the following: /B = clears BER window /C = clears all counters

Table 5-1. Display Commands (Cont'd)

N	Command
#	DSP ST BP {* *or* ccc[-ccc]…[,ccc[-ccc]] *or* 1:ss:ccc[-1:ss:ccc]…[,1:ss:ccc[-1:ss:ccc]]} DSP ST BP Nxxxx {* *or* n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]] *or* n:ss:cc[-n:ss:cc]… [,n:ss:cc[-n:ss:cc]] *or* n:ss:cc:sr[-n:ss:cc:sr]…[,n:ss:cc:sr[-n:ss:cc:sr]]} **Description:** Displays status of specified bypass channel(s) and clears phasor error history. (In the second command format shown above, Nxxxx n:ss:c is an originating or terminating I/O channel, n:ss:cc is an originating or terminating DS-0 or X.50 DS-0 channel, and n:ss:cc:sr is an originating or terminating X.50 subrate channel.)
#	DSP ST CH {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Displays loopback and phasor error status of all I/O channels in specified slot(s), and clears phasor error history.
#	DSP ST CLK[/C] **Description:** Displays status of PLL and nodal timing source. Optional /C modifier clears all clock errors, alarm 5, and alarm 23 in the alarm queue.
#	DSP ST DCM {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]}[/C] **Description:** Displays operation status of the D-Channel Module including ISDN protocol layer 2 and layer 3 performance parameter statistics of the D-Channel Module and B-channel, H0-channel, and D-channel connection status. Optional /C modifier clears the statistics.
#	DSP ST DL {* *or* ss[-ss]…[,ss[-ss]]}[*option*] DSP ST DL {* *or* 1:ss:cc[-1:ss:cc]…[,1:ss:cc[-1:ss:cc]]}[*option*] **Description:** In the first command format, displays status of specified intermachine link(s). In the second command format, displays status of specified integrated trunk bundle(s). *Option* is one of the following: /B = clears BER window /C = clears all counters and satellite buffer phasor error history ***NOTE**: Issuing /B will disconnect channels if present BER is less than user-specified link error performance rate.*
#	DSP ST DS0 {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Displays channel connect status, phasor error status, loopback status, and test tone status of all DS-0 channels on Voice Processor(s), Channelized Services Processor(s), and Integrated Trunk Module(s) in specified slot(s), and clears phasor error history.
#	DSP ST DS1 {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]}[/C] **Description:** Displays module alarm conditions, DS-0 connect failures, loopback and test tone status, function status, and number of DS-0 channel or bundle connections on Voice Processor(s), Channelized Services Processor(s), and Integrated Trunk Module(s) in specified slot(s). In addition, local and remote loss of frame alignment signals, local and remote loss of multiframe alignment signals, and red alarm messages are displayed for G.703 interfaces. Optional /C modifier clears existing frame buffer error in the display (Channelized Services Processor and Integrated Trunk Module only).
#	DSP ST LFM {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]}[*option*] **Description:** Displays status and history of LFM.3, LFM.10, LFM.11, LFM.12, or LFM.14 Link Framing Module(s) specified. *Option* is one of the following: /A = displays only modules with a history of red or yellow alarm (LFM.3, LFM.10, LFM.11, LFM.12) or out-of-service condition (LFM.14) /C = clears history and CRC error counters

Table 5-1. Display Commands (Cont'd)

N	Command
#	DSP ST POL {* *or* n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]]}[/C] **Description:** Displays the streaming data error and constant spaces error conditions for the specified broadcast/polling member(s). Optional /C modifier clears all errors and reenables the channel.
#	DSP ST QUA {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]}[/C] **Description:** Displays the errors of specified Voice Processor(s) and Channelized Services Processor(s) in 24-hour intervals. Optional /C modifier clears the data after data is displayed.
#	DSP ST SY[/T] **Description:** Displays system status. Optional /T modifier truncates the display, i.e., shows status information but does not show the modules logically and physically inserted in each slot.
#	DSP ST VCH {* *or* n:ss:cc[-n:ss:cc]…[,n:ss:cc[-n:ss:cc]]} **Description:** Displays associated I/O channels as well as the loopback status, phasor errors, fax connection attempt errors, and fax speed of the specified V-channels.
#	DSP ST XCH {* *or* n:ss:cc[-n:ss:cc]…[,n:ss:cc[-n:ss:cc]]}[/M] **Description:** Displays the operating status of the X.50 subrate channels for the specified X.50 DS-0 channel(s). Optional /M modifier displays the time slot map.
#	DSP ST XS0 {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]}[/C] **Description:** Displays the aggregate status of the X.50 DS-0 channels for the specified X.50 Server Module(s). The module operating status is also displayed. Optional /C modifier clears count of framing errors and losses.
#	DSP SY **Description:** Displays system parameters.
#	DSP TAQ [a[-a]…[,a[-a]]] or DSP TAQ [/C] **Description:** Displays time-stamped alarms in FIFO order.
#	DSP TIM **Description:** Displays time of day in hours:minutes:seconds, day of week, and day of the year as month-day-year.
#	DSP TOP **Description:** Displays all intermachine links and integrated trunks in a node and the slot and node number to which each intermachine link or integrated trunk is connected.
#	DSP TS {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Displays allocated time slots in a full T-1 frame for LFM.10, LFM.11, or LFM.12 Link Framing Module(s) specified.
#	DSP TST **Description:** Displays message generator counters for partial test.
#	DSP VPR {* *or* vp[-vp]…[,vp[-vp]]} **Description:** Displays the defined voice profile for the specified voice profile number(s).

Table 5-1. Display Commands (Cont'd)

N	Command
#	DSP XCH {* *or* n:ss:cc:sr[-n:ss:cc:sr] …[,n:ss:cc:sr[-n:ss:cc:sr]]} **Description:** Displays the current parameter values for the specified X.50 subrate channel(s) of an X.50 Server Module.
#	DSP XS0 {* *or* n:ss:cc[-n:ss:cc] …[,n:ss:cc[-n:ss:cc]]} **Description:** Displays the current parameter values for the specified X.50 DS-0 channel(s) of an X.50 Server Module.

entry in "N" column indicates that a command can be issued to a remote node by preceding the command with NOD xxxx.

a	=	alarm number
c	=	I/O channel number (1 to 4)
cc	=	DS-0 channel number (1 to 31) or X.50 DS-0 channel number (1 to 16)
ccc	=	bypass channel number (1 to 511)
n	=	nest number: 1 = Control Mainframe; 2 = Expander A Mainframe (upper); 3 = Expander B Mainframe (lower)
n:ss:c	=	specifies single channel
n:ss:c,n:ss:c	=	specifies two or more channels
n:ss:c - n:ss:c	=	specifies range of channels in ascending order
ppp	=	ABM profile (1 to 250 or D for default)
sp	=	speed profile (1 to 16)
ss	=	slot number
sr	=	X.50 subrate channel number (1 to 20)
vp	=	voice profile (1 to 64)
xxxx	=	node number (1 to 2000)
*	=	all elements in a range. Can also be used to specify all channels on a module, e.g., n:ss:*
[ ]	=	optional parameter. Brackets are never entered as part of command.
{ }	=	required parameter. Choose one of the elements within braces. Braces are never entered as part of command.
...	=	used before [ ] symbol to indicate command can be entered with several parameter values. Dots are never entered as part of command.

CLEAR ALARM LIST (CLR AQ) COMMAND

See "Display and Clear Alarm List (DSP AQ, CLR AQ) Commands" paragraph.

CLEAR TIME-STAMPED ALARM LIST (CLR TAQ) COMMAND

See "Display and Clear Time-stamped Alarm List (DSP TAQ, CLR TAQ) Commands" paragraph.

DISPLAY ACTIVE POLL GROUP (DSP ACT POL) COMMAND

The DSP ACT POL command displays the active group member of the specified broadcast/polling group, Figure 5-1.

Command:

[NOD xxxx] DSP ACT POL n:ss:c

For the local node, the display is updated continuously. Pressing any key at the supervisory terminal stops the display.

For the remote node, an instantaneous status of the broadcast/polling group is taken to display the current active group member.

```
N0010>DSP ACT POL 1:11:1
CHAN 1:11:01
```

CHAN 1:11:01 - Broadcast/polling message, where:

n:ss:cc = Indicates that the master channel in the specified nest:slot:channel location is active

CHAN nest:slot:channel = Indicates that the specified broadcast/polling group member is active

NONE ACTIVE = Indicates that an external error occurred and no broadcast/polling group members are active

NONE CONNECTED = Indicates that the master broadcast/polling channel is not connected

Figure 5-1. Typical Active Poll Group Display (DSP ACT POL)

DISPLAY AND CLEAR ALARM LIST (DSP AQ, CLR AQ) COMMANDS

The DSP AQ command displays alarm conditions that have occurred in the network since the last time the alarm list was cleared. The CLR AQ command clears the alarm list. The alarm numbers of any alarm conditions that are still in effect are then displayed. See Appendix A, Error and Status Messages, for a description of each alarm. See the "Display and Clear Time-stamped Alarm List (DSP TAQ, CLR TAQ) Commands" paragraph for information on displaying time-stamped alarms.

Commands:

[NOD xxxx] DSP AQ[/C]
[NOD xxxx] CLR AQ

where: /C = clears the alarm list after the alarms are displayed.

A typical DSP AQ command is illustrated in Figure 5-2. Except for alarms 06, 07, 13, 30, and 31, only the alarm number is displayed. Whenever alarm 06 or alarm 07 is displayed, one or more slot numbers are displayed to identify the affected Interlink Module(s) or Integrated Trunk Module(s). Whenever alarm 13 is displayed, the slot number is displayed to identify the Bypass Module failure or reset. Whenever alarm 30 is displayed, one or more slot numbers are displayed to identify the affected Voice Server Module(s) or D-Channel Module(s). Whenever alarm 31 is displayed, one or more slot numbers are displayed to identify the affected Link Framing Module(s).

NOTE: *Alarm 31 can be cleared only if the Link Framing Module status (DSP ST LFM) is cleared using the /C qualifier.*

ALARM NODE: xxxx is displayed when an alarm occurs at a remote node that has the local node on its alarm notification list. For more detailed information about the alarms at the remote node, enter a NOD xxxx DSP AQ command.

To further display the error conditions flagged by the alarm list, use the DSP ST CH, DSP ST DS0, DSP ST DS1, DSP ST DL, DSP ERR, DSP ST LFM, DSP ST SY, DSP ST ALM 1, DSP ST ALM 2, DSP ST ALM 6, DSP ST ALM 7, DSP ST ALM 9, DSP ST ALM 10, DSP ST ALM 12, DSP ST ALM 15, DSP ST ALM 21, DSP ST ALM 24, DSP ST ALM 25, DSP ST ALM 26, DSP ST ALM 27, DSP ST ALM 33, and DSP HIS commands.

```
N0010>DSP AQ
SLOT 1:02
ALARM 01 - MODULE INSERTED OR REMOVED
ALARM 05 - PLL OR CLOCK SOURCE ERROR
ALARM 06 - LINK IN-SERVICE    : 04
ALARM 07 - LINK OUT-OF-SERVICE: 04
ALARM 08 - FAN FAILURE
ALARM 09 - DATABASE CONFLICT
ALARM 10 - INVALID SLOT OR LOCAL NODE #
ALARM 11 - CLOCK SOURCE CONFLICT
ALARM 15 - ILP ALARM
ALARM 29 - DATABASE CHANGED

ALARM NODE:
 0001 0019 0022 0032 0033 0135 0140 0151 0199 0240 0400 0476 1670 2000

TIME: 16:06:30  DATE: THU SEP-16-1993
```

SLOT 1:02 - Nest:slot location of Network Module; apostrophe indicates offline module of redundant pair

ALARM 01 - Alarm number followed by alarm message for local Network Module (shown online) in slot 1:02. See Appendix A, Error and Status Messages, for a description of each alarm.

NOTE: Alarms 06 and 07 display slot locations of affected Interlink Module(s) or Integrated Trunk Module(s)

ALARM NODE - Remote alarm notification (online Network Module only)

TIME - Time of day in 24-hour format; hours:minutes:seconds

DATE - Date in day of week, month-day-year

Figure 5-2. Typical Alarm List Display (DSP AQ)

DISPLAY INTEGRATED TRUNK MODULE NONPROPRIETARY BUNDLE PARAMETERS (DSP BDL NPR) COMMAND

The DSP BDL NPR command displays the current nonproprietary bundle parameter values, Figure 5-3, of the specified Integrated Trunk Module.

Command:

[NOD xxxx] DSP BDL NPR **{*** *or* 1:ss:cc[-1:ss:cc]...**[**,1:ss:cc[-1:ss:cc]**]}**

```
N0010>DSP BDL NPR 1:10:01
         CONNECT   PROFILE   VPROFILE  PRIORITY  DELAYTHR  TX MODE   SIGNAL
1:10:01  ORIG      DEFAULT   NONE      01        02        Nx64K CC  NONE

         A OOS     B OOS     C  D OOS  OOS BITS  DSC ALM
1:10:01                                7E        ENABLE
```

1:10:01 - Nest:slot:channel number of bundle
CONNECT - Originator/terminator
PROFILE - ABM profile (when preceded by *, profile is undefined)
VPROFILE - Voice profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
TX MODE - Transport mode of operation
SIGNAL - Signaling mode
A OOS - Out-of-service operation for A signaling
B OOS - Out-of-service operation for B signaling
C D OOS - Out-of-service operation for C and D signaling, where:
SP = Space
MK = Mark
OOS BITS - Out-of-service bit pattern
DSC ALM - Disable/enable alarm

Figure 5-3. Typical Integrated Trunk Module Nonproprietary Bundle Parameter Display (DSP BDL NPR)

DISPLAY INTEGRATED TRUNK MODULE PROPRIETARY BUNDLE PARAMETERS (DSP BDL PR) COMMAND

The DSP BDL PR command displays the current proprietary bundle parameter values, Figure 5-4, of the specified Integrated Trunk Module.

Command:

[NOD xxxx] DSP BDL PR **{*** *or* 1:ss:cc[-1:ss:cc]...**[**,1:ss:cc[-1:ss:cc]**]}**

```
N0010>DSP BDL PR 1:10:15
         CONNECT   ARQ       SYNCS     TX MODE   SECURITY  ENCRYPT
1:10:15  PR-ORIG   200       04,LVL2   NxSW56K   DISABLE   NO

         BDL TYPE  GROOMING  POWERUP   LINKBACK  LINK EXP
1:10:15  DIAL LNK  DISABLE   NO CON    1:12:14   NONE

         GROUP     ALMTHLD   AL7MASK   UNIT
1:10:15  1-3----   DONT CARE ON        MASTER
```

1:10:15 - Nest:slot:channel number of bundle
CONNECT - Proprietary originator/terminator
ARQ - Supervisory channel bandwidth (bps)
SYNCS - Number of sync characters per scan cycle and sync character level
TX MODE - Transport mode
SECURITY - Security
ENCRYPT - Encryption
BDL TYPE - Bundle type
GROOMING - Grooming
POWERUP - Automatic connect at power-up
LINKBACK - Link backup bundle
LINK EXP - Link expansion bundle
GROUP - Group assignment
ALMTHLD - Alarm threshold
AL7MASK - Alarm 7 masking
UNIT - Master/slave designation

Figure 5-4. Typical Integrated Trunk Module Proprietary Bundle Parameter Display (DSP BDL PR)

DISPLAY BANDWIDTH (DSP BW) COMMAND

The DSP BW command displays the system bus bandwidth currently defined for Interlink Modules, Integrated Trunk Modules, and for local connections of Voice Server Modules, Voice Processors, Channelized Services Processors, and X.50 Server Modules, Figure 5-5.

Command:

[NOD xxxx] DSP BW

```
N0010>DSP BW
    ILC BW = 1544 KBS
    CSP BW = 216 KBS
    ILP BW = 72 KBS
    ILQ BW = 1040 KBS
    VSM BW = 2232 KBS
    XSM BW = 1000 KBS
DEFINED BW = 6104 KBS
```

ILC BW - Aggregate bandwidth assigned to Interlink Modules (For Interlink Modules operating in asymmetrical mode, the average bandwidth of the intermachine link is displayed. For Interlink Modules operating in simplex mode, half the bandwidth of the intermachine link is displayed.)

CSP BW - Aggregate bandwidth assigned to local connections of Channelized Services Processors

ILP BW - Aggregate bandwidth assigned to local connections of Voice Processors

ILQ BW - Aggregate bandwidth assigned to Integrated Trunk Modules

VSM BW - Aggregate bandwidth assigned to local connections of Voice Server Modules

XSM BW - Aggregate bandwidth assigned to local connections of X.50 Server Modules

DEFINED BW - Total system bus bandwidth defined

Figure 5-5. Typical System Bus Bandwidth Display (DSP BW)

DISPLAY BUNDLE CONFIGURATION (DSP CFG) COMMAND

The DSP CFG command displays the current bundle configuration for all the DS-0 channels of the specified Channelized Services Processor or Integrated Trunk Module, Figure 5-6.

Command:

[NOD xxxx] DSP CFG **{*** *or* 1:ss[-1:ss]...**[**,1:ss[-1:ss]**]}**[/M]

where: /M = displays the current bundle configuration by indicating each master DS-0 channel, speed of each bundle, size of each bundle, and members of each bundle. For Integrated Trunk Module, also displays ARQ bandwidth of each proprietary bundle as well as the total ARQ bandwidth for the slot, Figure 5-6B.

```
N0010>DSP CFG 1:9

ILQ  1:09
DS0       1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16
BUNDLE   01  02  01  04  01  02  01  04  01  02  01  04  01  02  01  04

DS0      17  18  19  20  21  22  23  24  25  26  27  28  29  30  31
BUNDLE   01  02  01  04  01  02  01  04  25  02  25  25  25  02  31
```

ILQ 1:09 - Nest:slot location of Integrated Trunk Module (or Channelized Services Processor)
DS0 - DS-0 channel number
BUNDLE - Master DS-0 channel number (- - indicates unassigned time slot)

A. DSP CFG COMMAND DISPLAY WITHOUT /M MODIFIER

```
N0010>DSP CFG 1:9/M

ILQ  1:09
MASTER   SPEED   ARQ BW   SIZE   MEMBERS
01       640K    6400     10     01 03 05 07 09 11 13 15 17 19
02       512K    4800     08     02 06 10 14 18 22 26 30
04       384K    2400     06     04 08 12 16 20 24
25       256K    1200     04     25 27 28 29
21       192K     600     03     21 23 31
--------------------------------
TOTAL           15400
```

ILQ 1:09 - Nest:slot location of Integrated Trunk Module (or Channelized Services Processor)
MASTER - Master DS-0 channel
SPEED - Speed of bundle
ARQ BW - ARQ bandwidth (Integrated Trunk Module only):
CONDS0 = bundle needs to be connected
DEFBDL = bundle needs to be defined
N/A = nonproprietary bundle
SIZE - Size of bundle (NG indicates bad bundle size count)
MEMBERS - Members of bundle

B. DSP CFG COMMAND DISPLAY WITH /M MODIFIER

Figure 5-6. Typical Bundle Configuration Display (DSP CFG)

DISPLAY CHANNEL PARAMETERS (DSP CH) COMMAND

The DSP CH command displays the current channel parameter values, Figure 5-7, for the specified I/O channels. For Quad Voice Modules, also displays the model type.

Command:

[NOD xxxx] DSP CH **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**

```
N0010>DSP CH 1:08:1
             SPEED      PROFILE    PRIORITY   DELAYTHR   CONNECT    FNS.
QSC   1:08:1 2400       5          01         02         ORIG       INBAND

             TYPE       PHRESET    PHASOR     OOS OPER   CTSGEN     CTSDELAY
QSC   1:08:1 DCE                   MX         DO NOTHING AUTO       28

             CTN.TYPE   B/W.FNS.
QSC   1:08:1 B/W        F1,-F1
```

QSC - Module type
1:08:1 - Nest:slot:channel number
SPEED - Channel speed (bps)
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
CONNECT - Originator/terminator of connection
FNS. - Mode of transmitting EIA functions, in-band or out-of-band
TYPE - Interface type
PHRESET - Receive phasor reset (DTE, in-band only)
PHASOR - Phasor size (bytes)
OOS OPER - Out-of-service operation
CTSGEN - Clear-to-send generation (DCE only)
CTSDELAY - Clear-to-send delay time in milliseconds (DCE, AUTO CTSGEN only)
CTN.TYPE - Contention type
B/W.FNS. - Bandwidth functions

A. TYPICAL SYNCHRONOUS CHANNEL (QSC, DSC) PARAMETER DISPLAY

```
N0010>DSP CH 3:05:1
             CONNECT    PROFILE    SPEED      PRIORITY   DELAYTHR   PHASOR
QVM   3:05:1 ORIG       4          32000      01         04         8

             CTN.TYPE   OOS OPER   DIAL.MOD   FNS.
QVM   3:05:1 OFF        FORCE BUSY PULSE      INBAND
```

QVM - Module type
3:05:1 - Nest:slot:channel number
CONNECT - Originator/terminator of connection
PROFILE - ABM profile (when preceded by *, profile is undefined)
SPEED - Channel speed (bps)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
PHASOR - Phasor size (bytes)
CTN.TYPE - Contention type
OOS OPER - Out-of-service operation
DIAL.MOD - Dial mode
FNS. - Mode of transmitting E & M signals, in-band or out-of-band

B. TYPICAL VOICE CHANNEL (QVM) PARAMETER DISPLAY

Figure 5-7. Typical Channel Parameter Displays (DSP CH) (Sheet 1 of 8)

```
N0010>DSP CH 2:1:1
             CONNECT    PROFILE    VPROFILE   SPEED      PRIORITY   DELAYTHR
QVM.3 2:01:1 ORIG       DEFAULT    4                     08         06

             CTN.TYPE   OOS OPER   CODE.LAW   PHASOR
QVM.3 2:01:1 OFF        FORCE BUSY            8
```

QVM.3 - Module type
2:01:1 - Nest:slot:channel number
CONNECT - Originator/terminator of connection
PROFILE - ABM profile (when preceded by *, profile is undefined)
VPROFILE - Voice profile (when preceded by *, profile is undefined)
SPEED - Channel speed (bps)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
CTN.TYPE - Contention type
OOS OPER - Out-of-service operation
CODE.LAW - Code law
PHASOR - Phasor size (bytes)

C. TYPICAL VOICE CHANNEL (QVM.2, QVM.3, AND QVM.5) PARAMETER DISPLAY

```
N0010>DSP CH 1:5:1
             CONNECT    PROFILE    VPROFILE   SPEED      PRIORITY   DELAYTHR
QVM.6 1:05:1 ORIG       3          NONE       64000      01         00

             OOS OPER   CODE.LAW   ECH CANL   ECH TAIL   CEN CLIP   1S.DNSTY
QVM.6 1:05:1 FORCE BUSY MU-LAW

             PHASOR
QVM.6 1:05:1 8
```

QVM.6 - Module type
1:05:1 - Nest:slot:channel number
CONNECT - Originator/terminator of connection
PROFILE - ABM profile (when preceded by *, profile is undefined)
VPROFILE - Voice profile (when preceded by *, profile is undefined)
SPEED - Channel speed (bps)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
OOS OPER - Out-of-service operation
CODE.LAW - Code law
ECH CANL - Echo canceler
ECH TAIL - Echo tail length
CEN CLIP - Center clipper
1S.DNSTY - Ones density
PHASOR - Phasor size (bytes)

D. TYPICAL VOICE CHANNEL (QVM.6) PARAMETER DISPLAY

Figure 5-7. Typical Channel Parameter Displays (DSP CH) (Sheet 2)

```
N0010>DSP CH 1:09:1
             SPEED      PROFILE    PRIORITY   DELAYTHR   CONNECT    FNS.
QSC   1:09:1 32000      7          01         00         ORIG       OUTBAND

             TYPE       PHRESET    PHASOR     OOS OPER   CTSGEN     CTSDELAY
QSC   1:09:1 DTE1                   4          FORCE FNS

             CTN.TYPE   B/W.FNS.
QSC   1:09:1 OFF
```

QSC - Module type (displays QSC for QVC Voice Modules)
1:09:1 - Nest:slot:channel number
SPEED - Channel speed (bps)
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
CONNECT - Originator/terminator of connection
FNS. - Mode of transmitting E & M signals (out-of-band only)
TYPE - Interface type (DTE1 only)
PHRESET - Not used
PHASOR - Phasor size (bytes)
OOS OPER - Out-of-service operation
CTSGEN - Not used
CTSDELAY - Not used
CTN.TYPE - Contention type (OFF only)
B/W.FNS. - Not used

E. TYPICAL QVC VOICE CHANNEL PARAMETER DISPLAY

```
N0010>DSP CH 3:4:1
             SPEED      PROFILE    PRIORITY   DELAYTHR   CONNECT    DATA
QAM   3:04:1 1200       *187       01         06         TERM       07

             TYPE       DTR.FUNC   OOS OPER   CTSGEN     CTSDELAY   POLARITY
QAM   3:04:1 DTE        TRNS       MARK FF                          INVERT

             CTN.TYPE   B/W.FNS.   P/E.CHAR   PARITY     STOP
QAM   3:04:1 OFF                    NO         ODD        1
```

QAM - Module type
3:04:1 - Nest:slot:channel number
SPEED - Channel speed (bps)
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
CONNECT - Originator/terminator of connection
DATA - Number of data bits
TYPE - Interface type
DTR.FUNC - Data terminal ready control (DTE only)
OOS OPER - Out-of-service operation
CTSGEN - Clear-to-send generation (DCE only)
CTSDELAY - Clear-to-send delay time in milliseconds (DCE, AUTO CTSGEN only)
POLARITY - Mark polarity
CTN.TYPE - Contention type
B/W.FNS. - Bandwidth functions
P/E.CHAR - Enable or disable system parity error character
PARITY - Parity type
STOP - Number of stop bits

F. TYPICAL ASYNCHRONOUS CHANNEL PARAMETER DISPLAY

Figure 5-7. Typical Channel Parameter Displays (DSP CH) (Sheet 3)

```
N0010>DSP CH 1:6:1
             CONNECT    PROFILE    VPROFILE   SPEED      PRIORITY   DELAYTHR
EVM   1:06:1 ORIG       2          1                     01         06

             PHASOR     CODE.LAW   1S.DNSTY   E-LD FTR   OOS OPER
EVM   1:06:1 8                                0          FORCE IDLE

             ECH CANL   ECH TAIL   CEN CLIP   TONE DSB   SF SIG
EVM   1:06:1

               TX TLP   IN DBM       RX TLP   IN DBM     FAX NSF
EVM   1:06:1        -18 .0                -18 .0         DISABLE
```

EVM - Module type
1:06:1 - Nest:slot:channel number
CONNECT - Originator/terminator of connection
PROFILE - ABM profile (when preceded by *, profile is undefined)
VPROFILE - Voice profile (when preceded by *, profile is undefined)
SPEED - Channel speed§
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
PHASOR - Phasor size (bytes)
CODE.LAW - Code law
1S.DNSTY - Ones density
E-LD FTR - E-lead filter
OOS OPER - Out-of-service operation
ECH CANL - Echo canceler§
ECH TAIL - Echo tail length§
CEN CLIP - Center clipper§
TONE DSB - Tone disable§
SF SIG - Single frequency signaling§
TX TLP IN DBM - Transmit transmission level point in dBm
RX TLP IN DBM - Receive transmission level point in dBm
FAX NSF - Fax nonstandard functions

§ = Values not displayed if a voice profile is selected.

G. TYPICAL VOICE CHANNEL (EVM) PARAMETER DISPLAY

Figure 5-7. Typical Channel Parameter Displays (DSP CH) (Sheet 4)

```
N0010>DSP CH 1:7:1
             CONNECT    PROFILE    VPROFILE   SPEED      PRIORITY   DELAYTHR
FXO   1:07:1 ORIG       1          NONE       8000       02         07

             PHASOR     CODE.LAW   1S.DNSTY   A/B FLTR   OOS OPER
FXO   1:07:1 8          MU-LAW     ON                    FORCE IDLE

             ECH CANL   ECH TAIL   CEN CLIP   TONE DSB   SF SIG
FXO   1:07:1 ENABLE     32 MS      ENABLE     ON         NONE

               TX TLP   IN DBM       RX TLP   IN DBM     FAX NSF
FXO   1:07:1        -10 .0                 -10 .0         ENABLE
```

FXO - Module type
1:07:1 - Nest:slot:channel number
CONNECT - Originator/terminator of connection
PROFILE - ABM profile (when preceded by *, profile is undefined)
VPROFILE - Voice profile (when preceded by *, profile is undefined)
SPEED - Channel speed§
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
PHASOR - Phasor size (bytes)
CODE.LAW - Code law
1S.DNSTY - Ones density
A/B FLTR - A/B bit filter
OOS OPER - Out-of-service operation
ECH CANL - Echo canceler§
ECH TAIL - Echo tail length§
CEN CLIP - Center clipper§
TONE DSB - Tone disable§
SF SIG - Single frequency signaling
TX TLP IN DBM - Transmit transmission level point in dBm
RX TLP IN DBM - Receive transmission level point in dBm
FAX NSF - Nonstandard fax features◊

§ = Values not displayed if a voice profile is selected.
◊ = FXO.3 and FXS.3 Modules only

H. TYPICAL VOICE CHANNEL (FXS AND FXO) PARAMETER DISPLAY

Figure 5-7. Typical Channel Parameter Displays (DSP CH) (Sheet 5)

```
N0010>DSP CH 1:5:1
             CONNECT    MODE       TYPE       SPD.PROF   OOS OPER   PHASOR
ICM   1:05:1 ORIG       PLESIOC    DTE1       DISABLE    MARK FF    10

             SPEED      PROFILE    PRIORITY   DELAYTHR   POLARITY   MIL.INT.
ICM   1:05:1 1544000    DEFAULT    01         02         D-N,F-N    D-B,F-B

             CTN.TYPE   B/W.FNS.   CTSGEN     CTSDELAY   MX.ADJST   BYTE CNT
ICM   1:05:1 OFF                                         1          1

             DSR/DTR    ERR.POL.   MX.STUFF
ICM   1:05:1 TRNS       NORMAL     04
```

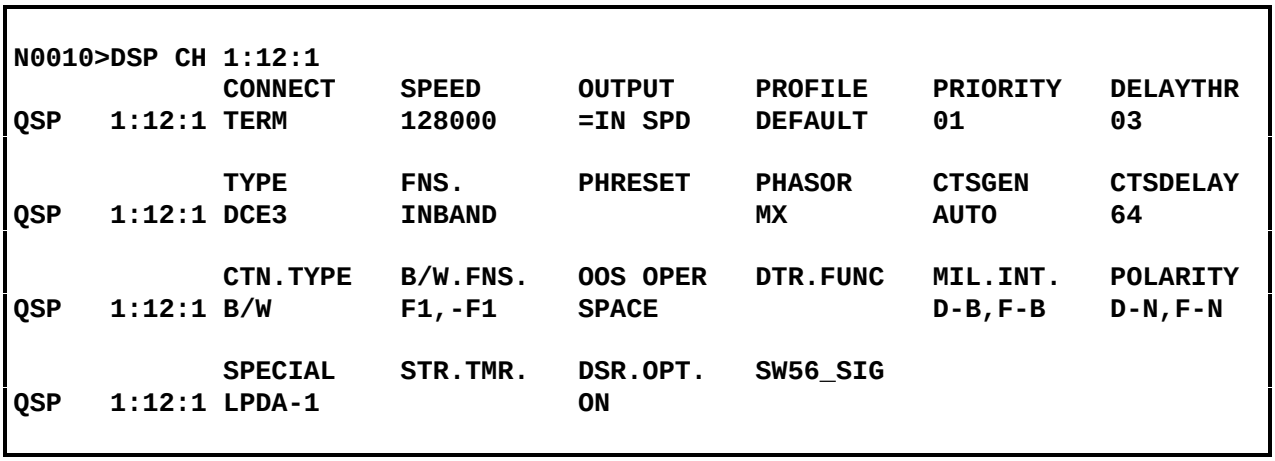
ICM - Module type
1:05:1 - Nest:slot:channel number
CONNECT - Originator/terminator of connection
MODE - Mode of operation
TYPE - Interface type
SPD.PROF - Speed profile (ENABLE/DISABLE)
OOS OPER - Out-of-service operation
PHASOR - Phasor size (bytes)
SPEED - Channel speed (bps) (When speed profile is enabled, speed profile number is displayed.)
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
POLARITY - Polarity, where:
- **D-N,F-N =** data normal, functions normal
- **D-I,F-N =** data inverted, functions normal
- **D-N,F-I =** data normal, functions inverted
- **D-I,F-I =** data inverted, functions inverted

MIL.INT. - Military switchable interface, where:
- **D-B,F-B =** data balanced, functions balanced
- **D-U,F-B =** data unbalanced, functions balanced
- **D-B,F-U =** data balanced, functions unbalanced
- **D-U,F-U =** data unbalanced, functions unbalanced

CTN.TYPE - Contention type
B/W.FNS. - Bandwidth functions
CTSGEN - Clear-to-send generation
CTSDELAY - Clear-to-send delay time in milliseconds
MX.ADJST - Maximum output clock adjustment
BYTE CNT - Byte counter
DSR/DTR - Data set ready, data terminal ready control
ERR.POL. - Error polarity
MX.STUFF - Maximum stuffer error correction

J. TYPICAL ISOCHRONOUS CHANNEL (ICM) PARAMETER DISPLAY

Figure 5-7. Typical Channel Parameter Displays (DSP CH) (Sheet 6)



```
N0010>DSP CH 1:12:1
             CONNECT    SPEED      OUTPUT     PROFILE    PRIORITY   DELAYTHR
QSP   1:12:1 TERM       128000     =IN SPD    DEFAULT    01         03

             TYPE       FNS.       PHRESET    PHASOR     CTSGEN     CTSDELAY
QSP   1:12:1 DCE3       INBAND                MX         AUTO       64

             CTN.TYPE   B/W.FNS.   OOS OPER   DTR.FUNC   MIL.INT.   POLARITY
QSP   1:12:1 B/W        F1,-F1     SPACE                 D-B,F-B    D-N,F-N

             SPECIAL    STR.TMR.   DSR.OPT.   SW56_SIG
QSP   1:12:1 LPDA-1                ON
```

QSP - Module type
1:12:1 - Nest:slot:channel number
CONNECT - Originator/terminator of connection
SPEED - Channel speed (bps)◊
OUTPUT - Output channel speed◊
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
TYPE - Interface type∆
FNS. - Mode of transmitting EIA functions: INBAND, OUTBAND, or NONE
PHRESET - Receive phasor reset (DTE, in-band only)
PHASOR - Phasor size
CTSGEN - Clear-to-send generation (DCE only)
CTSDELAY - Clear-to-send delay time in milliseconds (DCE, AUTO CTSGEN only)
CTN.TYPE - Contention type
B/W.FNS. - Bandwidth functions
OOS OPER - Out-of-service operation
DTR.FUNC - Data terminal ready control (DTE only)
MIL.INT. - Military switchable interface, where:
- **D-B,F-B =** data balanced, functions balanced
- **D-U,F-B =** data unbalanced, functions balanced
- **D-B,F-U =** data balanced, functions unbalanced
- **D-U,F-U =** data unbalanced, functions unbalanced

POLARITY - Polarity, where:
- **D-N,F-N =** data normal, functions normal
- **D-I,F-N =** data inverted, functions normal
- **D-N,F-I =** data normal, functions inverted
- **D-I,F-I =** data inverted, functions inverted

SPECIAL - Special features, where:
- **NONE =** No special features selected
- **LPDA-1 =** Link Problem Diagnostic Aid
- **56K/64K =** 56K service
- **BCAST/D =** Broadcast/polling, data sensitivity
- **BCAST/D/SP =** Broadcast/polling, data sensitivity, spacing alarm
- **BCAST/F =** Broadcast/polling, function sensitivity
- **BCAST/F/SP =** Broadcast/polling, function sensitivity, spacing alarm
- **SMPLX BCST =** Simplex broadcast mode

STR.TMR. - Anti-streaming timer, where:
- **OFF =** No anti-streaming timer
- **1-30** or **64 =** 1 to 30 seconds or 64 seconds

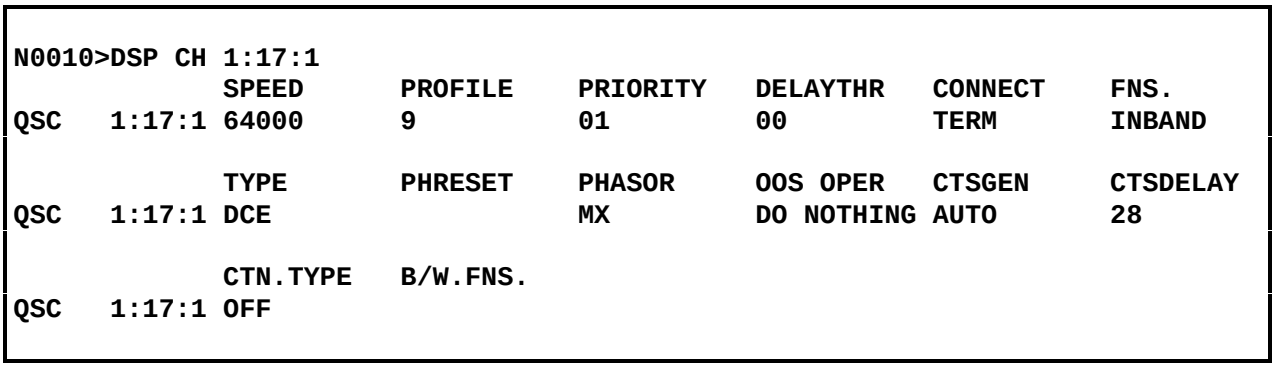
DSR.OPT. - Data set ready control
SW56_SIG - Switched 56K service with end-to-end signaling when enabled. 56K service without end-to-end signaling when disabled.

◊ = When value displayed is followed by a "g", the speed is not supported by Network Module type installed. The speed is recognized by the LINK/2+ System, but external clocking is required (that is, TYPE = DTE2) for other than QSP.12, QSP.14, and QSP.18 Module types.

∆= For "g" speeds, will display NG if interface type is defined as other than DTE2 and Module type is not QSP.12, QSP.14, or QSP.18.

K. TYPICAL SYNCHRONOUS CHANNEL (QSP) PARAMETER DISPLAY

Figure 5-7. Typical Channel Parameter Displays (DSP CH) (Sheet 7)


N0010>DSP CH 1:17:1
SPEED PROFILE PRIORITY DELAYTHR CONNECT FNS.
QSC 1:17:1 64000 9 01 00 TERM INBAND
TYPE PHRESET PHASOR OOS OPER CTSGEN CTSDELAY
QSC 1:17:1 DCE MX DO NOTHING AUTO 28
CTN.TYPE B/W.FNS.
QSC 1:17:1 OFF

QSC - Module type (displays QSC for Subrate Channel Processors)
1:17:1 - Nest:slot:channel number
SPEED - Channel speed (bps) (64000 only)
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level (01 only)
DELAYTHR - Delay threshold (00 only)
CONNECT - Originator/terminator of connection (TERM only)
FNS. - Mode of transmitting E & M signals (in-band only)
TYPE - Interface type (DCE only)
PHRESET - Not used
PHASOR - Phasor size (bytes) (MX only)
OOS OPER - Out-of-service operation (DO NOTHING only)
CTSGEN - Clear-to-send generation (AUTO only)
CTSDELAY - Clear-to-send delay time in milliseconds (28 only)
CTN.TYPE - Contention type (OFF only)
B/W.FNS. - Not used

L. TYPICAL SUBRATE CHANNEL PROCESSOR PARAMETER DISPLAY

Figure 5-7. Typical Channel Parameter Displays (DSP CH) (Sheet 8)

DISPLAY DATABASE CHECKSUM CONDITION (DSP CKS) COMMAND

The DSP CKS command displays the condition of the database checksum and the time and date of the last change made to the database, Figure 5-8. If a redundant Network Module is installed, the condition of the redundant module database checksum is also displayed.

Command:

[NOD xxxx] DSP CKS

```
N0010>DSP CKS
SLOT 1:01  NO ERROR 9A
SLOT 1:02' ERROR
LAST DB CHANGE: 13:00:53  DATE: TUE DEC-21-1993
```

SLOT 1:01 - Network Module
9A - Actual hexadecimal value of checksum
SLOT 1:02 ' - Redundant Network Module

LAST DB CHANGE: - Time and date of last change made to the database

Figure 5-8. Typical Checksum Display (DSP CKS)

DISPLAY CHANNEL CONNECT STATUS (DSP CON) COMMAND

The DSP CON command displays the destination channel and connect status of the specified I/O channels. The command also indicates whether a channel connection was established as a result of a logical node translation. If a bias route to the destination channel is defined, the bias intermachine link to be used is also displayed.

The DSP CON command is the same as the DSP DST CH command. See "Display Destination Channels (DSP DST *, DSP DST CH, DSP DST DS0) Commands" paragraph.

Command:

[NOD xxxx] DSP CON **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/Pppp]

where: ppp = ABM profile (1-250 or D for default). When this option is used, the command will display information for those channels within the range that have the specified profile.

DISPLAY SUPERVISORY COMPUTER PORT PARAMETERS (DSP CP) COMMAND

The DSP CP command displays the current supervisory computer port parameter values, Figure 5-9.

Command:

[NOD xxxx] DSP CP

```
N0010>DSP CP
SPEED        STOP         PARITY
9600         01           NONE
```

SPEED - Supervisory computer port speed (bps)
STOP - Number of stop bits
PARITY - Type of parity

Figure 5-9. Typical Supervisory Computer Port Parameter Display (DSP CP)

DISPLAY CHANNELIZED SERVICES PROCESSOR DS-1 PARAMETERS (DSP CSP) COMMAND

The DSP CSP command displays the current DS-1 parameter values, Figure 5-10, for the Channelized Services Processor(s) in the specified slot(s).

Command:

[NOD xxxx] DSP CSP **{*** *or* 1:ss[-1:ss]...**[**,1:ss[-1:ss]**]}**

```
N0010>DSP CSP 1:13
          FRAMING   CLEAR CH  TX CLOCK  PCM TYPE  LN DRV    OOS BITS
CSP  1:13 G.732S              SYS       A-PCM     INT       7F

          KG RATE   KG LEAD   KG MODE   KG POLR   INTL BIT  NATL BIT
CSP  1:13  5 SEC    BOTH      LEVEL     POSITIVE  1         1F
```

CSP 1:13 - Nest:slot number of Channelized Services Processor
FRAMING - Framing format
CLEAR CH - Clear channel
TX CLOCK - Source of transmit clock
PCM TYPE - PCM code law
LN DRV - Line driver type
OOS BITS - Out-of-service bit pattern
KG RATE - Retrain signal rate
KG LEAD - Retrain signal lead
KG MODE - Retrain signal mode
KG POLR - Retrain signal polarity
INTL BIT - International bit
NATL BIT - National bits

Figure 5-10. Typical Channelized Services Processor DS-1 Parameter Display (DSP CSP)

DISPLAY ISDN D-CHANNEL PARAMETERS (DSP DCM) COMMAND

The DSP DCM command displays the current ISDN D-channel parameter values, Figure 5-11, for the D-Channel Module(s) in the specified slot(s).

Command:

[NOD xxxx] DSP DCM **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP DCM 1:12
          NET TYPE   NET PLAN   NET ID     SERVICE    INTRFACE   POLARITY
DCM  1:12 NATIONAL   CARRIER    586        PSN        05         NORMAL
```

DCM 1:12 - Nest:slot number of D-Channel Module
NET TYPE - Network type
NET PLAN - Network plan
NET ID - Network ID
SERVICE - Service
INTRFACE - Interface
POLARITY - Polarity

Figure 5-11. Typical ISDN D-Channel Parameter Display (DSP DCM)

DISPLAY INTERMACHINE LINK PARAMETERS (DSP DL) COMMAND

The DSP DL command displays the current intermachine link parameter values, Figure 5-12, of the specified Interlink Module(s).

Command:

[NOD xxxx] DSP DL **{*** *or* ss[-ss]...**[**,ss[-ss]**]}**

```
N0010>DSP DL 3
          SPEED     RECEIVE   TXCLOCK   LN DRV    FRAME     SATDELAY  SATBUFF
LINK 1:03 2048000   =TX SPD   SYS       EXT       02        NONE

          ARQ       RXARQ     SYNCS     UNIT      SRM SEL   ALMTHLD   AL7MASK
LINK 1:03 9600                04,LVL1   SLAVE     NO        VGOOD<E-5 ON

          SECURITY  ENCRYPT   GROUP     TRNSLATE  NOD2TRNS  LFM SLOT  LFM BNDL
LINK 1:03 DISABLE   NO        123--6-   OFF                 3:12      A

          LINKBACK  LINK EXP  ACCESS    OOS TIME
LINK 1:03 1:12:2    1:12:1    n/a       60
```

LINK 1:03 - Nest:slot number of Interlink Module
SPEED - Intermachine link speed (bps)◊
RECEIVE - Receive intermachine link speed
TXCLOCK - Source of transmit clock
LN DRV - Line driver type and speed (INTERNAL or EXTERNAL mandatory)
FRAME - Frame mode
SATDELAY - Satellite delay
SATBUFF - Satellite buffer size (bits)
ARQ - Supervisory channel bandwidth (bps)
RXARQ - Receive supervisory channel bandwidth (bps)
SYNCS - Number of sync characters per scan cycle and sync character level
UNIT - Master/slave designation
SRM SEL - Subrate multiplexing
ALMTHLD - Alarm threshold
AL7MASK - Intermachine link alarm 7 masking
SECURITY - Intermachine link security (DISABLE or ENABLE)
ENCRYPT - Encryption
GROUP - Group assignment
TRNSLATE - Logical node translation
NOD2TRNS - Node to translate
LFM SLOT - Link Framing Module slot
LFM BNDL - Link Framing Module bundle
LINKBACK - Link backup bundle
LINK EXP - Link expansion bundle
ACCESS - Not Applicable
OOS TIME - Intermachine link out-of-service timer

◊ = When value displayed is followed by a "g", the speed is not supported by Network Module type installed. The speed is recognized by the LINK/2+ System, but external clocking is required (that is, TXCLOCK cannot be SYS).

Figure 5-12. Typical Intermachine Link Parameter Display (DSP DL)

DISPLAY VOICE PROCESSOR DS-0 PARAMETERS (DSP DS0) COMMAND

The DSP DS0 command displays the current parameter values, Figure 5-13, for the specified Voice Processor DS-0 channel(s).

Command:

[NOD xxxx] DSP DS0 **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

```
N0010>DSP DS0 1:9:1-1:9:5
         CONNECT   PROFILE   VPROFILE  PRIORITY  DELAYTHR  TX MODE   SIGNAL
1:09:01  ORIG      *  2         1      03        01                  AB
1:09:02  CONT      DEFAULT   NONE      01        02        A-PCM     AB
1:09:03  ORIG      *  6         1      03        01                  NONE
1:09:04  TERM         1      NONE      04        03        A-PCM     A
1:09:05  ORIG         9      *  3      02        01                  NONE

         A OOS     B OOS     C  D OOS  ABCD IDL  OOS BITS  DSC ALM   BUSYOUT
1:09:01  SP-MK     SPACE
1:09:02  SP-MK     SPACE               x100                          100 SEC
1:09:03                                        7E        ENABLE
1:09:04  MK-SP     MARK
1:09:05                                        E4        ENABLE

         PHASOR
1:09:01  08
1:09:02  14
1:09:03  08
1:09:04  14
1:09:05  08
```

1:09:01 - Nest:slot:channel number
CONNECT - Originator/terminator/contention connection
PROFILE - ABM profile (when preceded by *, profile is undefined)
VPROFILE - Voice profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
TX MODE - Transport mode of operation
SIGNAL - Signaling mode
A OOS - Out-of-service operation for A signaling
B OOS - Out-of-service operation for B signaling
C D OOS - Out-of-service operation for C and D signaling, where:
SP = Space
MK = Mark
ABCD IDL - ABCD idle bit pattern
OOS BITS - Out-of-service bit pattern
DSC ALM - Disable/enable alarm
BUSYOUT - Busy out timer
PHASOR - Phasor size

Figure 5-13. Typical Voice Processor DS-0 Parameter Display (DSP DS0)

DISPLAY VOICE PROCESSOR DS-1 PARAMETERS (DSP DS1) COMMAND

The DSP DS1 command displays the current DS-1 parameter values, Figure 5-14, for the Voice Processor(s) in the specified slot(s).

Command:

[NOD xxxx] DSP DS1 **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP DS1 1:9
          FRAMING   CLEAR CH  TX CLOCK  PCM TYPE  TX ADPCM  LN DRV    OOS BITS
ILP  1:09 D4        NO        RCV       MU-PCM    ANSI      EXT

          ILP MODE  KG RATE   KG LEAD   KG MODE   KG POLR   INTL BIT  NATL BIT
ILP  1:09 SCAN      30 SEC    BOTH      PULSE     NEGATIVE

          SEIZURE   PRE-EMPT  ORIG DSC  SEIZE ON
ILP  1:09  500 MS    2 SEC    33.0 SEC  SPACE
```

ILP 1:09 - Nest:slot number of Voice Processor
FRAMING - Framing format
CLEAR CH - Clear channel
TX CLOCK - Source of transmit clock
PCM TYPE - PCM code law
TX ADPCM - Transport ADPCM
LN DRV - Line driver type
OOS BITS - Out-of-service bit pattern
ILP MODE - Mode of operation
KG RATE - Retrain signal rate
KG LEAD - Retrain signal lead
KG MODE - Retrain signal mode
KG POLR - Retrain signal polarity
INTL BIT - International bits
NATL BIT - National bits
SEIZURE - Seizure time
PRE-EMPT - Pre-emption timer
ORIG DSC - Originator disconnect time
SEIZE ON - Seizure polarity

Figure 5-14. Typical Voice Processor DS-1 Parameter Display (DSP DS1)

DISPLAY DESTINATION CHANNELS (DSP DST, DSP DST CH, DSP DST DS0, DSP DST XS0, DSP DST XCH) COMMANDS

The DSP DST * command displays the destination channel and connect status of all I/O channels, all DS-0, all X.50 DS-0 channels, and all X.50 subrate channels at a node. To display the destination channel and connect status of specified channels, use the following commands:

- DSP DST CH command to display this information for specified I/O channels only
- DSP DST DS0 command to display this information for specified DS-0 channels only
- DSP DST XS0 command to display this information for specified X.50 DS-0 channels only
- DSP DST XCH command to display this information for specified X.50 subrate channels only

Each command also indicates whether a channel connection was established as a result of a logical node translation and the intermachine link speed at which the connection was established. If a bias route to the destination channel is defined, the bias intermachine link or bias integrated trunk bundle to be used is also displayed. See Figure 5-15 for a typical display.

Commands:

[NOD xxxx] DSP DST **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]** *or* n:ss:cc[-n:ss:cc]
...**[**,n:ss:cc[-n:ss:cc]**]** *or* n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}**[/Pppp]
[NOD xxxx] DSP DST CH **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/Pppp]
[NOD xxxx] DSP DST DS0 **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**[/Pppp]
[NOD xxxx] DSP DST XS0 **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**[/Pppp]
[NOD xxxx] DSP DST XCH **{*** *or* n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr**]}**[/Pppp]

where: ppp = ABM profile (1-250 or D for default). When this option is used, the command will display information for those channels within the range that have the specified profile.
cc = DS-0 channel number (1-31) or X.50 DS-0 channel number (1-16)
sr = X.50 subrate channel (1-20)

The DSP DST commands can be used to verify channel connections prior to and following programming of channel connections with any of the following commands:

- CNV BIAS
- CON
- CON CH
- CON DS0
- DEF BDL PR
- DEF BIAS CH
- DEF BIAS DS0
- DEF CH/
- DEF CON
- DEF DL
- DEF DST CH
- DEF DST DS0
- DEF DST XCH
- DEF DST XS0
- DEF XCH
- DEF XS0
- DSC
- DSC CH
- DSC DS0
- SET BIAS XCH
- SET BIAS XS0
- SET MAP

NOTES: *Channels must be disconnected before channel connections are redefined. Upon reconnection, the DSP DST commands will display the newly defined channel connections.*

The profile disconnect reason on a Destination Channel Display, Figure 5-15, indicating the override mode, shows what is currently being overridden and not why the channel went into the override mode. A plus sign precedes the displayed reasons. A plus sign alone indicates the reason cannot be determined.

```
N0010>DSP DST CH 1:3:*,1:5:1-1:7:4
ORIG 1:03:01   ->N0030 1:03:01    64000   DISC
ORIG 1:03:02   ->N0030 1:03:02    64000   LINK 04
ORIG 1:03:03   ->N0030 1:03:03    64000   LINK 04
ORIG 1:03:04   ->N0030 1:03:04    64000   LINK 04
ORIG 1:05:01   ->N0010 1:08:01    64000   LOCAL
ORIG 1:05:02   ->N0001 2:11:04    64000   ILQ  05:03
ORIG 1:05:03   ->N0010 1:02:01    64000S  LINK 11    B=10
ORIG 1:05:04   ->N0100 2:08:04    64000   DISC
ORIG 1:06:01   ->N0007 2:15:04    16000   DISC
CONT 1:06:02   ->N0001 2:11:04    16000A  LINK 08            +<GP>
CONT 1:06:03   ->N0010 1:06:03    16000   DISC PROFL          <GP, ST, EN, EP>
ORIG 1:06:04   ->N0010 1:06:04    16000   DISC
ORIG 1:07:01   ->N0026 2:11:04     8000A  DISC
ORIG 1:07:02   ->N0029 1:15:02     8000   DISC
ORIG 1:07:03   ->N0030 1:15:03     8000   DISC
ORIG 1:07:04   ->N0158 3:05:02     8000   PEND
```

ORIG - Connect type, where:
- **ORIG =** Originator
- **TERM =** Terminator
- **CONT =** Contention
- **PROP =** Proprietary

1:03:01 - (Following connect type) Nest:slot:channel number of local channel or bundle (includes master and slave broadcast/polling channel)

N0030 1:03:01- Node number and nest:slot:channel number of destination channel (Connections defined to local DS-0 channels display "DS0" until channel is connected. Slave broadcast/ polling channel connections display the host channel as the destination channel.) (If logical node translation is enabled and the command is issued from the originator node, the logical node number is displayed. If the command is issued from the terminator node, the physical node number is displayed.)

64000 - Intermachine link or bundle speed (bps)

NOTE: For Isochronous Communication Module channels with a defined speed profile, if the channel is disconnected, the profile number is displayed.
For Voice Server Module channels with a defined voice profile, if the channel is disconnected, the profile number is displayed.

NOTE: An "A" indicates the channel is operating in asymmetrical mode. An "S" indicates the channel is operating in simplex mode. Otherwise, the channel is operating in symmetrical mode.

Figure 5-15. Typical Destination Channel Display (DSP DST, DSP DST CH, DSP DST DS0, DSP DST XS0, or DSP DST XCH) (Sheet 1 of 3)

DISC - Connection status, where:

DISC = Disconnected—no connection attempted or channel disconnected by command

DISC ALARM = Disconnected—red or yellow alarm; or initial connection failed because of red or yellow alarm or because of hardware failure on Voice Processor or Channelized Services Processor (DS-0 channels only).

DISC BUMP = Disconnected due to bumping. Channel has been bumped by channel having higher bump level.

DISC BUSY = Another channel is already connected to terminator or DS-0 contention channel is busied out.

DISC EPR = Disconnected—BER degraded below link ABM profile error performance criteria.

DISC ERROR = Disconnected—incompatible parameters, no local/remote I/O module installed, or routing to destination node not defined

DISC GROOM = Disconnected due to grooming

DISC NO BW = Disconnected—no bandwidth available because:

- Bandwidth fully used
- No complete route to destination node
- Number of bypasses to destination node exceeds channel delay threshold parameter
- A channel has a bias route programmed, but the channel delay threshold parameter is not large enough to use the bias route.
- Inoperative Bypass Module at intermediate bypass node
- All of the bypass channels at one or more bypass nodes are already in use.
- Bypass connect queue at intermediate node is full.
- X.50 DS-0 channel is out-of-service.

DISC OPER = Operator disconnect (DS-0 contention channels and Isochronous Communication Module channels only)

DISC PHASR = Disconnected—specified phasor size too low to be accommodated by intermachine link frame

DISC PRMPT = Channel preempted (DS-0 contention channels only)

DISC PROFL = Channel disconnected due to failure to meet ABM profile criteria during connection process

DISC REV = Displayed when disconnect is due to the following:

- Channel's ABM routing criteria are all default values.
- The only violation is revision error.

For example, message would be displayed if a DS-0 channel attempted to connect over a LINK/1 System.

ILQ ss:cc = Integrated Trunk Bundle to which nonproprietary bundle is connected

LINK ss = Connected—identified by Interlink Module slot number

LINK ss-L = Connected via logical destination node number—identified by Interlink Module slot number

LINK ss* = Channel is connected to first bypass node (identified by Interlink Module slot number) but destination node has not yet acknowledged connection.

LOCAL = Channel is connected to a DS-0 channel at local node.

NOTE: During bundle dialing and alignment, DSP DST DS0 response indicates that bundle is connected. Since bundle and intermachine link status is not available yet, the DSP ST BDL response indicates the bundle is not connected. Upon completion of bundle dialing and alignment, the DSP ST BDL response will show bundle status.

LOCAL-L = Channel is connected via logical destination node number.

PEND = Channel is on connect queue waiting for initial connect attempt.

PEND *reason* = Channel is on connect queue waiting for connect attempt; *reason* can be any of the DISC reasons, for example, NO BW, BUSY, etc.

WAIT = Channel is on retry queue waiting for connect attempt.

WAIT *reason* = Channel is on retry queue waiting for connect attempt; *reason* can be any of the DISC reasons, for example, NO BW, BUSY, etc.

B =10 - Slot number (or slot and bundle number) of first intermachine link (bias route) that channel will be routed over

Figure 5-15. Typical Destination Channel Display (DSP DST, DSP DST CH, DSP DST DS0, DSP DST XS0, or DSP DST XCH) (Sheet 2)

+<GP> - ABM profile disconnect reason, where:

EN = Link encryption violation
EP = Error performance violation
GP = Link group violation
RV = Revision violation
ST = Satellite threshold violation

Channels connected in override or channels whose last connect attempt was an override connection will have status flagged with a plus sign. The plus sign will be followed by the ABM criteria that were overridden unless the ABM profile has been redefined since the connection was established.

Figure 5-15. Typical Destination Channel Display (DSP DST, DSP DST CH, DSP DST DS0, DSP DST XS0, or DSP DST XCH) (Sheet 3)

DISPLAY DESTINATION INTERMACHINE LINK (DSP DST DL) COMMAND

The DSP DST DL command displays the connection status of all channel connections on the specified Interlink Module intermachine link or the specified Integrated Trunk Module proprietary bundle. See Figure 5-16 for a typical display.

Command:

[NOD xxxx] DSP DST DL **{**ss *or* 1:ss:cc**}** **[**Nxxxx n:ss:c[-n:ss:c]**]**
[NOD xxxx] DSP DST DL **{**ss *or* 1:ss:cc**}** **[**Nxxxx n:ss:cc[-n:ss:cc]**]**
[NOD xxxx] DSP DST DL **{**ss *or* 1:ss:cc**}** **[**Nxxxx n:ss:cc:sr[-n:ss:cc:sr]**]**

The optional channel list results in a display of only those connections that originate or terminate at the specified channels.

NOTE: *If the DSP DST DL command is issued to an intermachine link or proprietary bundle that is actively connecting/disconnecting channels, a "CONNECT/DISCONNECT IN PROGRESS, COMMAND ABORTED" message may be displayed. In this case, the command should be reissued; the connect/disconnect will have completed and the command should be able to complete.*

```
N0001>DSP DST DL 4
                                        TRANSMIT  RECEIVE
001  N0001 1:12:04 -> N0100 1:16:04  144000    1600A LOCAL
002  N0005 1:12:03 -> N0100 1:16:03       0    1600S LINK 07   BP=015
003  N0001 1:12:02 -> N0100 1:16:02  144000    5200A LOCAL
004  N0002 1:12:01 -> N0003 1:08:02       0    9600S LINK 12   BP=148
```

001 - Channel connection number

N0001 1:12:04 - Node number and nest:slot:channel number of originator connection

-> N0100 1:16:04 - Node number and nest:slot:channel number of terminator connection

144000 1600 - Transmit and receive channel speeds. The displayed channel speeds represent the defined channel speeds plus the bandwidth required for in-band and out-of-band signaling.

NOTE: An "A" indicates the channel is operating in asymmetrical mode. An "S" indicates the channel is operating in simplex mode. Otherwise, the channel is operating in symmetrical mode. If the intermachine link is operating in symmetrical mode, only one column is displayed to indicate the transmit and receive speeds.

LOCAL - Connection status

For a list of connection status messages, see Figure 5-15, Typical Destination Channel Display (DSP DST *, DSP DST CH, DSP DST DS0, or DSP DST). DISC reasons appear for simplex connections only.

BP=015 - Bypass channel number

Figure 5-16. Typical Destination Intermachine Link Display (DSP DST DL)

DISPLAY EXTERNAL PORT PARAMETERS (DSP EP) COMMAND

The DSP EP command displays the current parameter values, Figure 5-17, of the external port that interfaces the LINK/2+ System to the LINK/CSU.

Command:

[NOD xxxx] DSP EP

```
N0010>DSP EP
*** EP PORT/ALARM-16 DISABLED ***
SPEED        STOP         PARITY       DATA
9600         01           EVEN         07
```

*****EP PORT/ALARM-16 DISABLED*** -** Message appears when alarm 16 Network Module DIP switch parameter is disabled.

SPEED - External port speed (bps)

STOP - Number of stop bits

PARITY - Type of parity

DATA - Number of data bits

Figure 5-17. Typical External Port Parameter Display (DSP EP)

DISPLAY ERROR (DSP ERR) COMMAND

The DSP ERR command displays errors that occurred on start-up or reset, Figure 5-18, for the Network Module, Interlink Module(s), Integrated Trunk Module(s), Dual Isochronous Module(s), Isochronous Communication Module(s), Voice Server Module(s), D-Channel Module(s), Quad Asynchronous Module(s), Enhanced Voice Module(s), Foreign Exchange Office Module(s), Foreign Exchange Station Module(s), Channelized Services Processor(s), Voice Processor(s), and X.50 Server Module(s). See Appendix A, Error and Status Messages, for a description of the messages for each module.

Command:

[NOD xxxx] DSP ERR

```
N0010>DSP ERR

NCL  SLOT 1:01
 ERROR DATABASE
 ERROR RTC

ILC  SLOT 1:03
 ERROR LINE DRV

CSP SLOT 1:08
 ERROR EQ-INTERFACE

ILP SLOT 1:11
 ERROR PHASOR CONVERTER

ICM SLOT 1:15
 ERROR RAM
 ERROR PROM

VSM SLOT 1:17
 ERROR CPU RAM

ILQ SLOT 1:18
 NO ERRORS

DCI SLOT 3:12
 ERROR STC 1
```

NCL SLOT 1:01 - Module type and slot location followed by error message(s). See Appendix A, Error and Status Messages, for a description of the messages for each module.

NOTE: For Network Module(s) (NCL), the "NO ERRORS" message may be displayed if an RTC failure clears itself after an initial failure. In addition, the "ERROR RTC" message will appear if the RTC fails after it is initially tested good.

Figure 5-18. Typical Start-Up Error Condition Display (DSP ERR)

DISPLAY EIA FUNCTIONS (DSP FN) COMMAND

The DSP FN command monitors and displays the status of the EIA control functions present at an I/O channel interface for the selected channel. The control functions are different for DCE and DTE channels, Figures 5-19A and 5-19B.

Command:

[NOD xxxx] DSP FN n:ss:c

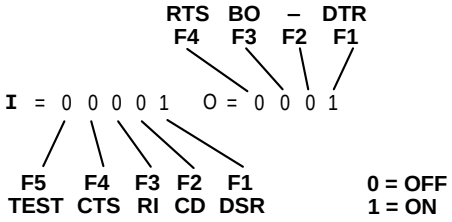
For a local channel, the EIA control function display is updated continuously. Pressing any key at the supervisory terminal stops the display.

For a remote channel, an instantaneous condition of the EIA control functions is displayed.

NOTE: *When a Quad Synchronous Processor channel is in LP loopback, the DSP FN command will show* ***remote input*** *functions in the "O=" part of the display.*

```
N0010>DSP FN 1:5:1
I=00001 O=0001
```

Where:

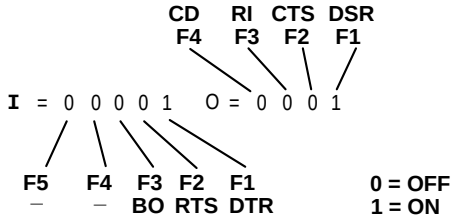


FUNC-TION	(I=) EIA INPUT TO LINK/2+ SYSTEM FROM DCE	(O=) EIA OUTPUT FROM LINK/2+ SYSTEM TO DCE
F5	Test	
F4	Clear-to-send (CTS) signal. For channel using 64 kbps Bipolar Interface Module, alarm indication signal (AIS). May toggle under data pass conditions. A steady 0 indicates AIS condition.	Request-to-send (RTS) signal
F3	Ring indicator (RI) signal. For analog voice channel, M lead from local PBX. For Quad Synchronous Processor channel in LPDA mode, test indicator (TI) signal. For Dual Isochronous Module channel, 1 indicates local channel is operating properly, 0 indicates a problem. For channel using 64 kbps Bipolar Interface Module, loss of sync (LOS) signal.	Out-of-service (BO) signal. For analog voice channel, E lead to local PBX. For Quad Synchronous Processor channel in LPDA mode, test mode (TM) signal. For Dual Isochronous Module channel, 1 indicates remote channel is operating properly, 0 indicates a problem.
F2	Data carrier detect (CD) signal	Not applicable: 1 or 0 displayed
F1	Data set ready (DSR) signal. For channel using 64 kbps Bipolar Interface Module, not applicable. 1 is displayed.	Data terminal ready (DTR) signal

A. DCE FUNCTION DISPLAY

```
N0010>DSP FN 1:5:2
I=00001 O=0001
```

Where:



FUNC-TION	(I=) EIA INPUT TO LINK/2+ SYSTEM FROM DTE	(O=) EIA OUTPUT FROM LINK/2+ SYSTEM TO DTE
F5	Not applicable: 1 or 0 displayed	
F4	Not applicable: 1 or 0 displayed	Data carrier detect (CD) signal
F3	Busy out (BO) signal. For Quad Synchronous Processor channel in LPDA mode, test mode (TM) signal. For Dual Isochronous Module channel, 1 indicates local channel is operating properly, 0 indicates a problem.	Ring indicator (RI) signal. For Quad Synchronous Processor channel in LPDA mode, test indicator (TI) signal. For Dual Isochronous Module channel, 1 indicates remote channel is operating properly, 0 indicates a problem.
F2	Request-to-send (RTS) signal	Clear-to-send (CTS) signal
F1	Data terminal ready (DTR) signal	Data set ready (DSR) signal

B. DTE FUNCTION DISPLAY

Figure 5-19. Typical EIA Function Display (DSP FN)

DISPLAY ALARM HISTORY (DSP HIS) COMMAND

The DSP HIS command displays the 10 most recent alarm messages for alarm 32 Switched 56K and ISDN dial-up connection errors for DS-0 channels, Figure 5-20. Table 5-2 displays alarm 32 error code messages and the corresponding descriptions.

Command:

[NOD xxxx] DSP HIS[/C][/K][/A]

where: /C = displays all messages (up to 255) and clears the alarm history buffer

/K = clears the alarm history buffer without displaying any messages

/A = displays all messages in the alarm history buffer (up to 255)

```
N0010>DSP HIS
THE LAST 007 DESIGNATED ALARM OCCURRENCES:
              DATE: MON JUL-26-1993
ALM:  CHAN:       TIME:       REASON:     DATA:
32    1:06:01     17:07:06    RETRY         1
32    1:06:02     18:03:01    UNAVALBL    ---
32    1:07:04     18:07:59    GROOMING    ---
32    1:07:05     23:01:02    INTENDED    ---
32    1:07:06     23:11:28    RETRY         6
              DATE: TUE JUL-27-1993
ALM:  CHAN:       TIME:       REASON:     DATA:
32    1:06:01     00:50:14    PHONE NO    ---
32    1:06:01     00:51:18    DATABASE    ---
```

DATE - Date of errors
ALM - Alarm type
CHAN - Nest:slot:channel number of bundle. Unless otherwise noted, the channel field indicates the master DS-0.
TIME - Time of errors
REASON - Type of errors, where:

AT TERM = User attempted to connect ISDN or SW56K at the terminator end. The channel field displays the master DS-0. The data field displays dashes.

AUTOGRM = Dialed-up bundle is being groomed automatically after the primary intermachine link is stable for 10 minutes. The data field displays dashes.

B NOT UP = One or more B-channels not in idle state; therefore, connection was aborted before phone numbers were dialed. The data field displays dashes (ISDN only).

BAD DCM = D-Channel Module hardware has failed. The data field displays dashes (ISDN only).

BDL FAIL = Bundle failed to come into sync within one minute. If the error was generated by an Integrated Trunk Module, the data field displays an error code. (see Table 5-2)

D DROP = The D-channel was down for 30 seconds; therefore, the D-channel, B-channels, and all DS-0 channels connected through this D-Channel Module are disconnected. The channel field indicates the D-Channel. The data field displays dashes (ISDN only).

D RESET = The D-channel was down for 3 minutes; therefore, the D-Channel Module was reset. The channel field displays the D-channel. The data field displays dashes (ISDN only).

Figure 5-20. Typical Alarm History Display (DSP HIS) (Sheet 1 of 2)

REASON - Type of errors, where (cont'd):

DATABASE = An ISDN or Switched 56K bundle cannot be connected because the bundle was not defined or was incorrectly defined in the database. The data field displays dashes.

DCHANNEL = Connect request to the D-Channel Module was not sent because the D-channel is not connected. The data field displays dashes (ISDN only).

DCMNOTUP = Connect request has been sent to the D-Channel Module; however, the module is not online yet. The data field displays dashes (ISDN only).

DISC.ERR = Connect request rejected by D-Channel Module due to an error before dialing, or connect request aborted due to insufficient ARQ bandwidth. The data field displays dashes (ISDN only).

GROOMING = Dialed-up bundle being groomed at system grooming time. (Backup bundles are not reconnected at system grooming reconnect time.) The data field displays dashes.

INTENDED = Dialed-up bundle manually disconnected. The data field displays dashes.

ISDNFAIL = Establishment of ISDN dialed link has failed. The data field displays an error value (0-255) that is returned from the network (see Table 5-2). The channel field displays the failed DS-0, which may not be the master (ISDN only).

MISALIGN = The bundle has failed to align. The data field displays an error value; see Table 5-2.

NETWORK = A disconnect was received from the network. The data field displays an error value (0-255) that is returned from the network; see Table 5-2 (ISDN only).

PHONE NO = Connection was initiated; however, phone numbers have not been defined for one or more DS-0 channels. The data field displays dashes.

REDALARM = Integrated Trunk Module is in red alarm or has been reset. The data field displays dashes.

RETRY = A phone connection for a DS-0 has failed and the connection is being retried. The data field displays the failed DS-0.

SW56FAIL = Establishment of Switched 56K dialed link has failed after retries. The channel field displays the failed DS-0 (SW56K only). The data field displays an error value; see Table 5-2.

UNAVALBL = Backup bundle not available, for example, backup bundle already claimed as backup by another failed link. The data field displays dashes.

DATA - Dashes or number that provides additional information for the type of error stated in reason field

Figure 5-20. Typical Alarm History Display (DSP HIS) (Sheet 2)

Table 5-2. Alarm 32 Error Code Messages

Alarm 32 Error Type	Error Code	Description
ISDNFAIL or NETWORK	1	Unassigned destination number
	2	No route to specified transit network
	3	No route to destination
	6	Channel unacceptable to sending entity
	7	Channel negotiation failure
	16	Normal call clearing
	17	User busy
	18	No user responding
	19	No answer from user after alerting indication has been provided
	21	Call rejected
	22	Number changed
	27	Destination out of order
	28	Number format is invalid or incomplete
	29	Requested facility cannot be provided
	31	Normal, unspecified
	34	No circuit/channel available
	38	Network out of order
	41	Temporary network failure
	42	Switching equipment congestion
	43	Access information discarded
	44	Requested circuit/channel not available
	45	Circuit/channel preempted by another call
	47	Resources unavailable, unspecified
	49	Quality service unavailable
	50	User is not subscribed to requested facility
	52	Outgoing calls barred
	54	Incoming calls barred
	57	Bearer capability not authorized
	58	Bearer capability not presently available
	63	Service or option not available, unspecified
	65	Bearer capability not implemented
	66	Channel type not implemented
	69	Requested facility not implemented
	70	Only restricted digital information bearer capability is available
	79	Service or option not implemented, unspecified
	81	Invalid call reference value
	82	Identified channel does not exist
	88	Incompatible destination
	90	Destination address missing
	95	Invalid message, unspecified
	96	Mandatory information element is missing
	97	Message type non-existent or not implemented
	98	Message is recognized but call state is in error
	99	Information element non-existent or not implemented
	100	Invalid information element contents
	101	Message not compatible with call state
	102	Recovery procedure initiated after timer expiration
	111	Protocol error, unspecified
	127	Error generated by a network with no error messaging capabilities
BDL FAIL	57	SW56 failed to assign crosspoint DS-0s

Table 5-2. Alarm 32 Error Code Messages (Cont'd)

Alarm 32 Error Type	Error Code	Description
	58	SW56 failed to establish proprietary bundle
MISALIGN	11	Failure to assign scanner DS-0s
	21	Failure during start of write/read sequence numbers
	22	Failure during retries to read sequence numbers
	23	Failure during start of write/read acknowledge
	24	Failure during retries to read acknowledge
	31	Failure calculating network delay
	32	Failure verifying network delay
	33	Failure during broadcast of alignment pattern
	42	ISDN failure to establish proprietary bundle
	43	ISDN failure to stop pattern broadcast
SW56FAIL	64	SW56 unsolicited disconnect from network
	65	SW56 network did not respond with a wink
	66	SW56 no answer from terminating end
	67	SW56 network is off hook
	68	SW56 network glare detected
	69	SW56 failed to connect echo canceler disable tone
	70	SW56 failed to disconnect echo canceler disable tone
NOTE: Error type BDL FAIL will only display a code number if the error is generated by an Integrated Trunk Module.		

DISPLAY INTEGRATED TRUNK MODULE DS-1 PARAMETERS (DSP ILQ) COMMAND

The DSP ILQ command displays the current DS-1 parameter values, Figure 5-21, for the Integrated Trunk Module(s) in the specified slot(s).

Command:

[NOD xxxx] DSP ILQ **{*** *or* 1:ss[-1:ss]...**[**,1:ss[-1:ss]**]}**

```
N0010>DSP ILQ 1:10
          FRAMING   CLEAR CH  TX CLOCK  PCM TYPE  LFM SLOT  LFM BNDL
ILQ  1:10 G.732N              RCV       A-PCM     NONE

          LN DRV    OOS BITS  INTL BIT  NATL BIT  CRC-4
ILQ  1:10 INT                 0         1E        ENABLE
```

ILQ 1:10 - Nest:slot number of Integrated Trunk Module
FRAMING - Framing format
CLEAR CH - Clear channel
TX CLOCK - Source of transmit clock
PCM TYPE - PCM code law
LFM SLOT - Link Framing Module slot
LFM BNDL - Link Framing Module bundle
LN DRV - Line driver type
OOS BITS - Out-of-service bit pattern
INTL BIT - International bit
NATL BIT - National bits
CRC-4 - Cyclic redundancy check

Figure 5-21. Typical Integrated Trunk Module DS-1 Parameter Display (DSP ILQ)

DISPLAY LINK FRAMING PARAMETERS (DSP LFM) COMMAND

The DSP LFM command displays the model type and current parameter values, Figure 5-22, for the LFM.3, LFM.10, LFM.11, LFM.12, or LFM.14 Link Framing Module(s) in the specified slot(s).

Command:

[NOD xxxx] DSP LFM **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP LFM 1:7
            SPEED       TX CLOCK    TX CRC      RX CRC
LFM.3  1:07 1152K - 18  SYS         ENABLE      ENABLE
```

LFM.3 - Link Framing Module type
1:07 - Nest:slot location of specified Link Framing Module
SPEED - Intermachine link speed and DS-0 count
TX CLOCK - Source of transmit clock
TX CRC - Transmit cyclic redundancy check
RX CRC - Receive cyclic redundancy check

A. TYPICAL LFM.3 LINK FRAMING MODULE PARAMETER DISPLAY

```
N0010>DSP LFM 1:11
            A:FRAME     B:FRAME
LFM.12 1:11 D4          D4

            A:SPEED     A:LN DRV    A:LENGTH    A:TX CLK    A:YELLOW    A:B8ZS
LFM.12 1:11   56K=56x1  EXT         ->267 FT    SYS         ENABLE      ENABLE

            B:SPEED     B:LN DRV    B:LENGTH    B:TX CLK    B:YELLOW    B:B8ZS
LFM.12 1:11   56K=56x1  EXT         ->267 FT    SYS         ENABLE      ENABLE
```

LFM.12 - Link Framing Module type
1:11 - Nest:slot location of specified Link Framing Module
A:FRAME - Framing format for connection A
B:FRAME - Framing format for connection B (two-to-two mode only)
A:SPEED - Intermachine link speed and DS-0 count/bundle size for connection A
A:LN DRV - Line driver type for connection A
A:LENGTH - Line length for connection A
A:TX CLK - Source of transmit clock for connection A
A:YELLOW - Yellow alarm for connection A
A:B8ZS - Bipolar operation for connection A
B:SPEED - Intermachine link speed for connection B (two-to-one or two-to-two mode only)
B:LN DRV - Line driver type for connection B (two-to-two mode only)
B:LENGTH - Line length for connection B (two-to-two mode only)
B:TX CLK - Source of transmit clock for connection B (two-to-two mode only)
B:YELLOW - Yellow alarm for connection B (two-to-two mode only)
B:B8ZS - Bipolar operation for connection B (two-to-two mode only)

B. TYPICAL LFM.12 LINK FRAMING MODULE PARAMETER DISPLAY

Figure 5-22. Typical Link Framing Parameter Displays (DSP LFM) (Sheet 1 of 2)

```
N0010>DSP LFM 1:13
            A:MODULE    A: SPEED    B:MODULE    B: SPEED
LFM.14 1:13 UNFRAMED      64K=64x1  NONE

            C:MODULE    C: SPEED    D:MODULE    D: SPEED
LFM.14 1:13 D5          1544 K      UNFRAMED      64K=64x1
```

LFM.14 - Link Framing Module type
1:13 - Nest:slot location of specified Link Framing Module
A:MODULE - Framing type for connection A
A:SPEED - Intermachine link speed and DS-0 count/bundle size for connection A
B:MODULE - Framing type for connection B
B:SPEED - Intermachine link speed and DS-0 count/bundle size for connection B
C:MODULE - Framing type for connection C
C:SPEED - Intermachine link speed and DS-0 count/bundle size for connection C
D:MODULE - Framing type for connection D
D:SPEED - Intermachine link speed and DS-0 count/bundle size for connection D

C. TYPICAL LFM.14 LINK FRAMING MODULE PARAMETER DISPLAY

Figure 5-22. Typical Link Framing Parameter Displays (DSP LFM) (Sheet 2)

DISPLAY MAP FOR X.50 SUBRATE CHANNELS (DSP MAP) COMMAND

The DSP MAP command displays the X.50 subrate channel database time slot assignments, Figure 5-23, for the specified X.50 DS-0 channel(s) of an X.50 Server Module.

[NOD xxxx] DSP MAP **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

where: cc = X.50 DS-0 channel (1-16)

```
N0020>DSP MAP 1:5:1
XS0 1:05:01          TIMESLOT MAP :
PHASE: A  A  A  A   B  B  B  B   C  C  C  C   D  D  D  D   E  E  E  E
TSLOT: 01 06 11 16  02 07 12 17  03 08 13 18  04 09 14 19  05 10 15 20
XCHAN: 01 01 01 01  02 03 02 03  -- -- -- --  04 05 06 07  -- -- -- --
```

XS0 1:05:01 - Nest:slot:X.50 DS-0 channel number
PHASE - X.50 time slot grouping (A-E)
TSLOT - Time slots in X.50 frame
XCHAN - X.50 subrate channels
-- (dashes) - Unassigned time slots

Figure 5-23. Typical X.50 Subrate Channel Map Display (DSP MAP)

DISPLAY MASTER DS-0 CHANNELS (DSP MDS0) COMMAND

The DSP MDS0 command displays the current parameter values, Figure 5-24, for the specified master DS-0 channel(s) of a Channelized Services Processor.

Command:

[NOD xxxx] DSP MDS0 **{*** *or* 1:ss:cc[-1:ss:cc]...**[**,1:ss:cc[-1:ss:cc]**]}**

NOTE: *The DSP MDS0 command must be issued to master DS-0 channel(s). If the command is issued to slave DS-0 channel(s), the command is rejected.*

```
N0010>DSP MDS0 1:9:6,1:9:11,1:9:18,1:9:22
         CONNECT   PROFILE   PRIORITY  DELAYTHR  TX MODE   SIGNAL
1:9:06   ORIG      2         01        07        A-PCM     NONE
1:9:11   ORIG      2         01        07        A-PCM     AB
1:9:18   ORIG      2         01        07        A-PCM     A
1:9:22   ORIG      2         01        07        A-PCM     AB

         A OOS     B OOS     C  D OOS  OOS BITS  DSC ALM
1:9:06                                1A        ENABLE
1:9:11   MARK      MARK
1:9:18   SP-MK     SPACE
1:9:22   MARK      MARK
```

1:9:06 - Nest:slot:channel number of master DS-0 channel
CONNECT - Originator/terminator of connection
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
TX MODE - Transport mode of operation
SIGNAL - Signaling mode
A OOS - Out-of-service operation for A signaling
B OOS - Out-of-service operation for B signaling
C D OOS - Out-of-service operation for C and D signaling, where:
SP = Space
MK = Mark
OOS BITS - Out-of-service bit pattern
DSC ALM - Disable/enable alarm

Figure 5-24. Typical Master DS-0 Channel Parameter Display (DSP MDS0)

DISPLAY PHONE NUMBERS (DSP PHN BCK, DSP PHN XDL) COMMANDS

The DSP PHN BCK and DSP PHN XDL commands display the ISDN or Switched 56K phone number directories for the specified Interlink Module or Integrated Trunk Module, Figure 5-25. The DSP PHN BCK command displays the directory of phone numbers used for the dial-up service link backup feature utilized by the Interlink Module and the Integrated Trunk Module. The DSP PHN XDL command displays the directory of phone numbers used for the dial-up service link expansion and dial link features utilized only by the Integrated Trunk Module.

Commands:

[NOD xxxx] DSP PHN BCK 1:ss
[NOD xxxx] DSP PHN XDL 1:ss

```
N0010>DSP PHN XDL 1:10
DS0 NTL TYPE  LISTED DIRECTORY NUMBER   DS0 NTL TYPE  LISTED DIRECTORY NUMBER
01            201-555-1234-1555-11      17
02            201-555-2222              18
03            201-555-3333              19
04            609-555-4321              20
05                                      21
06                                      22
07    I  H0   011-44-555:473#*          23
08                                      24
09                                      25
10                                      26
11                                      27
12                                      28
13                                      29
14                                      30
15                                      31
16
```

DS0 - DS-0 channels

NTL - National or international
An "**I**" indicates an international phone number.
If blank, the phone number is national (domestic).

TYPE - B-channel type or H0-channel type
An "H0" indicates an H0-channel.
If blank, the channel is a B-channel.

LISTED DIRECTORY NUMBER - ISDN or Switched 56K phone number. The asterisk (*) and pound sign (#) are used with ISDN applications only.

Figure 5-25. Typical Phone Number Directory for Expansion Display (DSP PHN XDL)

DISPLAY BROADCAST/POLLING CONNECT STATUS (DSP POL) COMMAND

The DSP POL command displays the connect status and master channel of the specified broadcast/polling group member(s), Figure 5-26.

Command:

[NOD xxxx] DSP POL **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/A]

where: /A = displays the connect status of all members in the broadcast/polling group of the specified master channel

```
N0010>DSP POL 1:11:1-1:11:4

CHAN 1:11:01 -> CONNECTED     MASTER CHAN
CHAN 1:11:02 -> CONNECTED     MASTER CHAN 1:11:01
CHAN 1:11:03 -> CONNECTED     MASTER CHAN 1:11:01
CHAN 1:11:04 -> CONNECTED     MASTER CHAN 1:11:01
```

CHAN 1:11:01 - Nest:slot:channel number of Quad Synchronous Processor

CONNECTED - Connect status (See Appendix A, Error and Status Messages, for connect status messages.)

MASTER CHAN - Master broadcast/polling group channel

MASTER CHAN 1:11:01 - Nest:slot:channel number of master channel of the indicated broadcast/polling group member

Figure 5-26. Typical Broadcast/Polling Connect Status Display (DSP POL)

DISPLAY PROM PART NUMBER (DSP PPN) COMMAND

The DSP PPN command displays PROM part number(s) for module(s) in the specified slot location(s), Figure 5-27. This display enables you to identify current firmware or software configuration of the following modules: Network Module, Interlink Module, Integrated Trunk Module, Channelized Services Processor, Voice Processor, Voice Server Module, D-Channel Module, Quad Asynchronous Module, Enhanced Voice Module, Foreign Exchange Station Module, Foreign Exchange Office Module, Isochronous Communication Module, Dual Isochronous Module, and X.50 Server Module.

Command:

[NOD xxxx] DSP PPN **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP PPN *
NCL  SLOT 1:01
 RP48101C
 RP50012A-A
 RP50012A-B

ILC  SLOT 1:03
 RP50013A

ILQ  SLOT 1:05
 RP47780B
 RP50003B
 RP50004B

ILP SLOT 1:07
 RP47698C

VSM SLOT 1:09
 RP48142A
 RP48141A

XSM SLOT 1:11
 RP48117A
 RP48120A
```

NCL SLOT 1:01 - Module type and slot location
RPnnnnnA - PROM part number, where:
RPnnnnn = Indicates part number
A = Suffix letter indicates firmware or software revision level

NOTE: For NCL Module, the boot PROM version is listed first, followed by the software version in the flash EPROM bank (-A or -B) that is online, followed by the software version in the other flash EPROM bank (-A or -B) that is offline. For ILQ, VSM.3, VSM.5, and XSM Modules, the boot PROM version is listed first, followed by the software version.

Figure 5-27. Typical PROM Part Number Display (DSP PPN)

DISPLAY ABM PROFILE PARAMETERS (DSP PRO) COMMAND

The DSP PRO command displays the ABM profile parameters for the specified ABM profile(s), Figure 5-28.

Command:

[NOD xxxx] DSP PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**[/D]
[NOD xxxx] DSP PRO /D

where: ppp = ABM profile (1-250)
* = displays parameters of all ABM profiles
/D = includes default ABM profile parameters in the display

If DSP PRO/D is entered alone, without ABM profile numbers, the command displays only the default parameters of the ABM profile.

```
N0010>DSP PRO 6/D
            ENCRYPT      MAXSAT       LNKEPR       LNKGRP       GROOMING
DEFAULT     DONT CARE    DONT CARE    DONT CARE    DONT CARE    DISABLE
PROFILE 006 DONT CARE    02           VGOOD <E-5   1            ENABLE

            BMPSTATE     BMPLEVEL     OVERRIDE
DEFAULT     DISABLE                   DISABLE
PROFILE 006 BUMPEE       04           ENABLE
```

DEFAULT - Default ABM profile parameters (displayed when /D is included in command)
PROFILE 006 - Parameters for ABM profile specified in command
ENCRYPT - Encryption
MAXSAT - Satellite threshold
LNKEPR - Link error performance
LNKGRP - Link group
GROOMING - Grooming (ENABLE/DISABLE)
BMPSTATE - Bumping state
BMPLEVEL - Bumping level (displayed only when the bumping state is BUMPER, BUMPEE, or BOTH)
OVERRIDE - Override (ENABLE/DISABLE)

Figure 5-28. Typical ABM Profile Parameter Display (DSP PRO)

DISPLAY QUALITY PARAMETERS (DSP QUA) COMMAND

The DSP QUA command displays the current quality parameter values defined for performance monitoring of the interface of the Voice Processor(s) or Channelized Services Processor(s) specified, Figure 5-29.

Command:

[NOD xxxx] DSP QUA **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP QUA 1:11

ILP  1:11

ALARM                      : ENABLE
SAMPLE INTERVAL            : 10 SEC
ERROR TEST PERIOD          : 24 HR
SEVERE ERROR TEST PERIOD   : 15 MIN
SEVERE ERROR               : 100
ERROR THRESHOLD            : 1200
SEVERE ERROR THRESHOLD     : 200
```

ILP 1:11 - Voice Processor location (CSP location is displayed when the DSP QUA command is issued for a Channelized Services Processor.)
ALARM - Enable/disable Quality Alarm Report
SAMPLE INTERVAL - Quality sample interval
ERROR TEST PERIOD - Error test period
SEVERE ERROR TEST PERIOD - Severe error test period
SEVERE ERROR - Number of errors in sample interval that, if exceeded, will be declared a severe error
ERROR THRESHOLD - Error threshold
SEVERE ERROR THRESHOLD - Severe error threshold

Figure 5-29. Typical Quality Parameter Display (DSP QUA)

DISPLAY REVISION (DSP REV) COMMAND

The DSP REV command displays the contents of the module revision PROM for the specified Network Module, Voice Processor, Channelized Services Processor, Integrated Trunk Module, Enhanced Voice Module, Foreign Exchange Station Module, Foreign Exchange Office Module, Isochronous Communication Module, Voice Server Module, D-Channel Module, or X.50 Server Module, Figure 5-30.

Command:

[NOD xxxx] DSP REV **{*** *or* n:ss**}**

```
N0010>DSP REV *

SLOT 1:01
 AW47116-OX1  REV OX-01  M-NCL.    SN1234567

SLOT 1:06
 AW15291-1    REV 02-    M-ILP     SN1234567
```

SLOT 1:01 - Slot location of module
AW47116-OX1 - Assembly number
REV OX-01 - Revision level
M-NCL. - Module name
SN1234567 - Serial number

Figure 5-30. Typical Revision Parameter Display (DSP REV)

DISPLAY ROUTING PARAMETERS (DSP RTE) COMMAND

The DSP RTE command displays the current routing parameter values to the nodes specified, Figure 5-31.

Command:

[NOD xxxx] DSP RTE **{*** *or* xxxx[-xxxx]...**[**,xxxx[-xxxx]**]}**

```
N0010>DSP RTE 2,3,4,97
NODE:0002
LINK  BUNDLE  PATH DELAY
11      01       00
05     N/A       03
17      04       03

NODE:0003
LINK  BUNDLE  PATH DELAY
17      05       01
03     N/A       02
05     N/A       02

NODE:0004
LINK  BUNDLE  PATH DELAY
17      06       00

NODE:0097
LINK  BUNDLE  PATH DELAY
05     N/A       00
11      01       01
17      06       01
```

NODE:0002 - Node to which intermachine links are routed

LINK - Slot location of Interlink Module or Integrated Trunk Module associated with intermachine link

BUNDLE - Bundle number for Integrated Trunk Module (not applicable for Interlink Module)

PATH DELAY - Path delay (00 to 07) = minimum number of bypasses between local node and node specified

Figure 5-31. Typical Routing Parameter Display (DSP RTE)

DISPLAY SIGNALING (DSP SIG DS0) COMMAND

The DSP SIG DS0 command continuously displays the signaling of the specified Voice Processor, Channelized Services Processor, or Integrated Trunk Module DS-0 channel at both the DS-1 interface (EQ) and the common bus (LI), Figure 5-32. The specified Channelized Services Processor or Integrated Trunk Module DS-0 channel must have a bundle size of 1. To end the display, press the RETURN key.

Command:

[NOD xxxx] DSP SIG DS0 n:ss:cc

NOTE: *Attempting to display signaling for transparent (DATA) DS-0 channels will be rejected.*

```
N0010>DSP SIG DS0 1:11:2

ILP 1:11:02
EQ: A B C D  LI: A B C D
    1 1 1 1      1 1 1 1
```

ILP 1:11:02 - Voice Processor location (ILQ location is displayed when the DSP SIG DS0 command is issued for an Integrated Trunk Module and CSP location is displayed when the DSP SIG DS0 command is issued for a Channelized Services Processor.)

EQ - Equipment signaling
A - A signal
B - B signal
C - C signal
D - D signal
LI - Line signaling

NOTE: If no signaling is present on the specified DS-0 channel, the message "NO SIGNALING EXISTS FOR THIS DS0" is displayed.

Figure 5-32. Typical DS-0 Channel Signaling Display (DSP SIG DS0)

DISPLAY SIGNALING (DSP SIG EQ) COMMAND

The DSP SIG EQ command displays the instantaneous state of the signals received from the DS-1 interface by the Voice Processor(s), Channelized Services Processor(s), or Integrated Trunk Module(s) specified, Figure 5-33, for all DS-0 channels.

NOTE: *Displayed information will only be valid for a Channelized Services Processor or Integrated Trunk Module when the bundle size is 1.*

Command:

[NOD xxxx] DSP SIG EQ **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP SIG EQ 1:11

ILP  1:11
DS0  01  02  03  04  05  06  07  08  09  10  11  12  13  14  15
  A   1   1   1   1   0   1   1   1   1   0   1   1   1   1   1
  B   1   0   1   1   1   1   1   1   1   1   1   1   1   0   1
  C   1   1   1   1   1   1   1   1   1   1   1   0   1   1   1
  D   1   1   1   1   1   1   1   0   1   1   1   1   1   1   1

DS0  17  18  19  20  21  22  23  24  25  26  27  28  29  30  31
  A   1   1   1   1   0   1   1   1   1   1   1   1   1   1   0
  B   1   1   1   1   1   1   0   1   1   1   1   1   0   1   1
  C   0   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  D   1   1   0   1   0   1   1   0   1   0   1   1   1   1   1
```

ILP 1:11 - Voice Processor location (ILQ location is displayed when the DSP SIG EQ command is issued for an Integrated Trunk Module and CSP location is displayed when the DSP SIG EQ command is issued for a Channelized Services Processor.)

DS0 - DS-0 channel numbers
A - A signal
B - B signal
C - C signal
D - D signal

Figure 5-33. Typical Signaling from DS-1 Interface Display (DSP SIG EQ)

DISPLAY SIGNALING (DSP SIG LI) COMMAND

The DSP SIG LI command displays the instantaneous state of the signals sent to the DS-1 interface from the Voice Processor(s), Channelized Services Processor(s), or Integrated Trunk Module(s) specified, Figure 5-34, for all DS-0 channels.

NOTE: *Displayed information will only be valid for a Channelized Services Processor or Integrated Trunk Module when the bundle size is 1.*

Command:

[NOD xxxx] DSP SIG LI **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP SIG LI 1:11

ILP  1:11
DS0  01  02  03  04  05  06  07  08  09  10  11  12  13  14  15
  A   1   1   1   1   1   1   1   1   1   1   1   1   0   1   1
  B   1   0   1   1   1   1   1   0   1   0   1   1   1   1   1
  C   1   1   1   1   0   1   1   1   1   1   1   1   1   0   1
  D   0   1   1   1   1   1   1   1   1   0   0   1   1   1   1

DS0  17  18  19  20  21  22  23  24  25  26  27  28  29  30  31
  A   1   1   0   1   1   1   1   1   1   1   1   1   1   1   1
  B   1   1   1   1   1   0   1   1   1   1   0   1   1   1   1
  C   0   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  D   1   1   1   0   1   1   1   1   1   1   1   0   1   0   1
```

ILP 1:11 - Voice Processor location (ILQ location is displayed when the DSP SIG LI command is issued for an Integrated Trunk Module and CSP location is displayed when the DSP SIG LI command is issued for a Channelized Services Processor.)

DS0 - DS-0 channel numbers
A - A signal
B - B signal
C - C signal
D - D signal

Figure 5-34. Typical Signaling toward DS-1 Interface Display (DSP SIG LI)

DISPLAY SUPERVISORY PORT PARAMETERS (DSP SP) COMMAND

The DSP SP command displays the current supervisory port parameter values, Figure 5-35.

Command:

[NOD xxxx] DSP SP

```
N0010>DSP SP
*** DEFAULT PARAMETERS SELECTED ***
SPEED        STOP         DATA
9600         01           8BITS NONE
```

***** DEFAULT PARAMETERS SELECTED *** -** Message appears when Network Module DIP switch K1-7 is set to OFF/OPEN to indicate default parameters are in effect.

SPEED - Supervisory port speed (bps)
STOP - Number of stop bits
DATA - Number of data bits and type of parity

Figure 5-35. Typical Supervisory Port Parameter Display (DSP SP)

DISPLAY SPEED PROFILE (DSP SPR) COMMAND

The DSP SPR command displays the defined Isochronous Communication Module speed(s) for the specified profile number, Figure 5-36.

Command:

[NOD xxxx] DSP SPR **{*** *or* sp[-sp]...**[**,sp[-sp]**]}**

where: sp = speed profile number (1-16)

```
N0010>DSP SPR 4

PROF: 04    1544000    1064000     728000     504000     336000
             224000     153600     100000      64000      40800
              19200
```

PROF: 04 - Speed profile number followed by valid speed(s) (bps)

NOTE: When "invalid" is displayed instead of a valid speed, a speed not supported by the Isochronous Communication Module was defined via TIME/VIEW or the computer port.

Figure 5-36. Typical Speed Profile Display (DSP SPR)

DISPLAY STATUS ALARM 1 (DSP ST ALM 1) COMMAND

The DSP ST ALM 1 command displays the nest and slot numbers for modules that were inserted or removed, Figure 5-37.

Command:

[NOD xxxx] DSP ST ALM 1[/C]

where: /C = clears the alarm 1 history

NOTE: *The prompt appears if no modules were inserted or removed since the last DSP ST ALM 1/C command was issued or since start-up/Network Module reset.*

```
N0010>DSP ST ALM 1

MODULE INSERTED OR REMOVED: 1:10
```

1:10 - Nest:slot number of module

Figure 5-37. Typical Alarm 1 Status Display (DSP ST ALM 1)

DISPLAY STATUS ALARM 2 (DSP ST ALM 2) COMMAND

The DSP ST ALM 2 command displays the nest and slot number for modules that have start-up hardware errors, Figure 5-38.

Command:

[NOD xxxx] DSP ST ALM 2[/C]

where: /C = clears the alarm 2 history

NOTE: *The prompt appears if no modules have had start-up hardware errors since the last DSP ST ALM 2/C command was issued or since start-up/Network Module reset.*

```
N0010>DSP ST ALM 2

HARDWARE ERROR ON STARTUP: 1:09
```

1:09 - Nest:slot number of module

Figure 5-38. Typical Alarm 2 Status Display (DSP ST ALM 2)

DISPLAY STATUS ALARM 6 (DSP ST ALM 6) COMMAND

The DSP ST ALM 6 command displays the Interlink Module slot numbers and the Integrated Trunk Module slot and bundle numbers for intermachine links that are declared in-service, Figure 5-39. Alarm 6 is generated when a new bundle comes online or when a dialed facility is connected. Alarm 6 is also generated when an alarm 7 (link declared out-of-service) has occurred and the link quality has improved sufficiently to restore service.

Command:

[NOD xxxx] DSP ST ALM 6[/C]

where: /C = clears the alarm 6 history

```
N0010>DSP ST ALM 6

IN-SERVICE ILCS:     03 05
IN-SERVICE BUNDLES:  10:01 10:05
```

03 05 - In-service Interlink Module slot numbers

10:01 10:05 - In-service Integrated Trunk Module slot:bundle numbers

Figure 5-39. Typical Alarm 6 Status Display (DSP ST ALM 6)

DISPLAY STATUS ALARM 7 (DSP ST ALM 7) COMMAND

The DSP ST ALM 7 command displays the Interlink Module slot numbers and the Integrated Trunk Module slot and bundle numbers for intermachine links that are declared out-of-service, Figure 5-40. The reason for each out-of-service condition is also displayed.

Command:

[NOD xxxx] DSP ST ALM 7[/C]

where: /C = clears the alarm 7 history

```
N0010>DSP ST ALM 7

OUT-OF-SERVICE LINKS:
ILC  04    - REMOTE END RESET
ILQ  07:01 - LOCAL OUT OF SYNC       07:02 - REMOTE OUT OF SYNC
     07:03 - ARQ FAILURE             07:10 - LOSS OF CLOCK
     07:11 - BUNDLE RESET            07:16 - BUNDLE LOOPBACK
     07:24 - EXTERNAL LOOPBACK
ILQ  11    - COMMAND RESET
```

ILC 04 - Out-of-service Interlink Module slot number followed by reason for out-of-service condition

ILQ 07:01 - Out-of-service Integrated Trunk Module slot:proprietary bundle number followed by reason for out-of-service condition

ILQ 11 - Integrated Trunk Module alarm (overrides any bundle alarms)

Figure 5-40. Typical Alarm 7 Status Display (DSP ST ALM 7)

DISPLAY STATUS ALARM 9 (DSP ST ALM 9) COMMAND

The DSP ST ALM 9 command displays the nest and slot numbers for modules that have database/hardware conflicts, Figure 5-41.

Command:

[NOD xxxx] DSP ST ALM 9[/C]

where: /C = clears the alarm 9 history

NOTE: *The prompt appears if no modules have experienced database/hardware conflicts since the last DSP ST ALM 9/C command was issued or since start-up/Network Module reset.*

```
N0010>DSP ST ALM 9

DATABASE CONFLICT: 1:10
```

1:10 - Nest:slot number of module

Figure 5-41. Typical Alarm 9 Status Display (DSP ST ALM 9)

DISPLAY STATUS ALARM 10 (DSP ST ALM 10) COMMAND

The DSP ST ALM 10 command, Figure 5-42, indicates the LINK/2+ System has been identified with an invalid node number and/or a module in the displayed slot has failed to respond to the Network Module. The Network Module nest and slot numbers are displayed if a node number greater than 2000 has been defined.

Command:

[NOD xxxx] DSP ST ALM 10[/C]

where: /C = clears the alarm 10 history

NOTE: *The prompt appears if no invalid local node number or nonresponsive module errors have occurred since the last DSP ST ALM 10/C command was issued or since start-up/Network Module reset.*

```
N0010>DSP ST ALM 10

INVALID SLOT OR LOCAL NODE # 1:10 3:03
```

1:10 3:03 - Nest:slot numbers of modules that caused the alarm

Figure 5-42. Typical Alarm 10 Status Display (DSP ST ALM 10)

DISPLAY STATUS ALARM 12 (DSP ST ALM 12) COMMAND

The DSP ST ALM 12 command displays the nest, slot, and channel numbers for channels or DS-0s that have failed initial connection attempts, Figure 5-43. For Integrated Trunk Module nonproprietary bundles, this alarm may also indicate a public network problem for the specified DS-0.

Command:

[NOD xxxx] DSP ST ALM 12[/C]

where: /C = clears the alarm 12 history

```
N0024>DSP ST ALM 12
CONNECTION FAILURE
    1:05       1:07:01    1:07:02    1:07:03    1:07:04    1:11:01
    1:11:02:20 2:05:01    2:05:02    2:05:03    2:05:04    2:07:01
    3:01:04    2:07:02    2:07:03    2:07:04    3:01:01    3:01:02
    3:01:03
```

1:05 - Nest:slot number of Interlink Module with simplex channel connection failure (appears at the receiving end of an intermachine link with a simplex channel connection failure)

1:07:01 - Nest:slot:bundle number of channel/DS-0 connection failure

1:11:01 - Nest:slot:X.50 DS-0 channel number connection failure

1:11:02:20 - Nest:slot:X.50 DS-0:X.50 subrate channel number connection failure

Figure 5-43. Typical Alarm 12 Status Display (DSP ST ALM 12)

DISPLAY STATUS ALARM 15 (DSP ST ALM 15) COMMAND

The DSP ST ALM 15 command displays the alarm 15 status history of all Voice Processors at the node, Figure 5-44.

Command:

[NOD xxxx] DSP ST ALM 15[/C]

where: /C = clears the alarm 15 history after alarms are displayed

```
N0010>DSP ST ALM 15

ILP  1:11  ALARM : NONE
           QUALITY : GOOD
                 **DISC ALARM**
```

ILP 1:11 - Voice Processor location

ALARM - Alarm condition, where:

- **NONE =** No alarm
- **RED =** Red alarm
- **YELLOW =** Yellow alarm
- **RED/YELLOW =** Red and yellow alarm

QUALITY - Quality threshold exceeded alarm, where:

- **GOOD =** No error threshold exceeded
- **ERROR THRESHOLD EXCEEDED =** Error threshold exceeded
- **SEVERE ERROR THRESHOLD EXCEEDED =** Severe error threshold exceeded
- **ERROR/SEVERE THRESHOLD EXCEEDED =** Both error and severe error threshold exceeded

****DISC ALARM** -** Indicates that a DS-0 channel has failed to connect (will only be displayed if that DS-0 channel has DSC ALM parameter enabled)

Figure 5-44. Typical Alarm 15 Status Display (DSP ST ALM 15)

DISPLAY STATUS ALARM 21 (DSP ST ALM 21) COMMAND

The DSP ST ALM 21 command displays the alarm 21 status history of all Channelized Services Processors and Integrated Trunk Modules at the node, Figure 5-45.

Command:

[NOD xxxx] DSP ST ALM 21[/C]

where: /C = clears the alarm 21 history after alarms are displayed

```
N0010>DSP ST ALM 21

ILQ  1:10  ALARM : NONE
CSP  1:03  ALARM : RED
           QUALITY : GOOD
                 **DISC ALARM**
```

ILQ 1:10 - Integrated Trunk Module location
CSP 1:03 - Channelized Services Processor location
ALARM - Alarm condition, where:
- **NONE =** No alarm
- **RED =** Red alarm
- **YELLOW =** Yellow alarm
- **RED/YELLOW =** Red and yellow alarm

QUALITY - Quality threshold exceeded alarm (Channelized Services Processor only), where:
- **GOOD =** No error threshold exceeded
- **ERROR THRESHOLD EXCEEDED =** Error threshold exceeded
- **SEVERE ERROR THRESHOLD EXCEEDED =** Severe error threshold exceeded
- **ERROR/SEVERE THRESHOLD EXCEEDED =** Both error and severe error threshold exceeded

****DISC ALARM** -** Indicates that a DS-0 channel has failed to connect (will only be displayed if that DS-0 channel has DSC ALM parameter enabled)

Figure 5-45. Typical Alarm 21 Status Display (DSP ST ALM 21)

DISPLAY STATUS ALARM 24 (DSP ST ALM 24) COMMAND

The DSP ST ALM 24 command displays the required, current, and worst bit error rate (BER), Figure 5-46, for intermachine links and integrated trunk bundles whose BER fell below the error performance alarm threshold specified in the intermachine link parameters or in the integrated trunk bundle parameters. Alarm 24 is generated each time a link or bundle degrades below the user-specified required BER alarm threshold. Alarm 24 is not generated by an offline module.

Command:

[NOD xxxx] DSP ST ALM 24[/C]

where: /C = clears the alarm 24 history after alarms are displayed

NOTE: *The alarm queue is not cleared. The command DSP AQ/C will clear the alarm queue but will not clear alarm 24 history.*

```
N0010>DSP ST ALM 24

LINK      REQUIRED BER     CURRENT BER     WORST BER
03        VERY GOOD        VERY GOOD       GOOD
04'       VERY GOOD        VERY GOOD       GOOD
10:01     VERY GOOD        VERY GOOD       FAIR
```

LINK - Slot location of Interlink Module or slot:bundle of Integrated Trunk Module producing alarm 24

REQUIRED BER - Required bit error rate as specified by alarm threshold parameter (VERY GOOD, GOOD, or FAIR)

CURRENT BER - Current bit error rate (VERY GOOD, GOOD, FAIR, or POOR)

WORST BER - Worst bit error rate (GOOD, FAIR, or POOR) since the violation occurred. Value is updated each time the bit error rate degrades below the last violation.

04' - Apostrophe indicates offline module of redundant pair.

Figure 5-46. Typical Alarm 24 Status Display (DSP ST ALM 24)

DISPLAY STATUS ALARM 25 (DSP ST ALM 25) COMMAND

The DSP ST ALM 25 command displays BER information, Figure 5-47, for intermachine links and integrated trunk bundles whose BER meets or exceeds the error performance alarm threshold specified in the intermachine link parameters or in the integrated trunk bundle parameters. Alarm 25 is generated only after an alarm 24 (error performance violation) has occurred and the link or bundle quality has improved sufficiently to remove the violation. Alarm 25 is not generated by an offline module.

Command:

[NOD xxxx] DSP ST ALM 25[/C]

where: /C = clears the alarm 25 history

```
N0010>DSP ST ALM 25

LINK      REQUIRED BER     CURRENT BER
03        VERY GOOD        VERY GOOD
10:01     VERY GOOD        VERY GOOD
```

LINK - Slot location of Interlink Module or slot:bundle of Integrated Trunk Module producing the alarm

REQUIRED BER - Required bit error rate as specified by alarm threshold parameter (VERY GOOD, GOOD, or FAIR)

CURRENT BER - Current bit error rate (VERY GOOD, GOOD, FAIR, or POOR)

Figure 5-47. Typical Alarm 25 Status Display (DSP ST ALM 25)

DISPLAY STATUS ALARM 26 (DSP ST ALM 26) COMMAND

The DSP ST ALM 26 command displays channels that were disconnected due to error performance violations. Information on up to 32 disconnected channels is displayed, Figure 5-48.

Command:

[NOD xxxx] DSP ST ALM 26[/C]

where: /C = clears the alarm 26 history. Alarm 26 will not reoccur until more disconnects result from error performance violations.

```
N0010>DSP ST ALM 26
THE LAST 32 CHANNEL(S) DISCONNECTED DUE TO EP VIOLATION:

                DATE: JUL-27-1993
CHAN:    TIME:                    CHAN:    TIME:
1:09:24  17:01:20                 1:09:23  17:01:12
1:09:22  17:01:10                 1:09:21  17:01:05
1:09:20  17:01:01                 1:09:19  17:00:43
1:09:18  17:00:40                 1:09:17  17:00:31
1:05:16  03:00:26                 1:05:15  03:00:20
1:05:14  03:00:09                 1:05:13  03:00:06
1:05:12  03:00:03                 1:05:12  03:00:01
                DATE: JUL-26-1993
CHAN:    TIME:                    CHAN:    TIME:
1:07:18  23:10:34                 1:07:17  23:10:30
1:07:16  23:10:24                 1:07:15  23:10:20
1:07:14  23:10:09                 1:07:13  23:10:06
1:07:12  23:10:04                 1:07:11  23:10:00
1:07:10  22:00:01                 1:07:09  21:40:58
1:07:08  21:40:52                 1:07:07  21:40:50
1:07:06  21:40:20                 1:07:05  21:40:18
1:07:04  21:40:16                 1:07:03  21:40:14
1:07:02  21:40:12                 1:07:01  21:40:10
```

THE LAST 32 CHANNEL(S) - Number of channels disconnected due to error performance violation since alarm 26 was last cleared. If more than 32 disconnects occurred, the last 32 will be displayed.

DATE - Date of disconnect

CHAN - Nest:slot:channel number of disconnected channels

TIME - Time of disconnect (hour:minute:second)

Figure 5-48. Typical Alarm 26 Status Display (DSP ST ALM 26)

DISPLAY STATUS ALARM 27 (DSP ST ALM 27) COMMAND

The DSP ST ALM 27 command displays channels that were disconnected due to bumping. Information on up to 32 disconnected channels is displayed, Figure 5-49.

Command:

[NOD xxxx] DSP ST ALM 27[/C]

where: /C = clears the alarm 27 history. Alarm 27 will not reoccur until more disconnects result from bumped channels.

```
N0001>DSP ST ALM 27
THE LAST 32 CHANNEL(S) DISCONNECTED DUE TO BUMPING:

                          DATE: SEP-27-1993
CHAN:    TIME:     BUMPER:            CHAN:    TIME:     BUMPER:
1:09:24  17:01:20  N0010 1:14:24      1:09:23  17:01:12  N0010 1:14:23
1:09:22  17:01:10  N0010 1:14:22      1:09:21  17:01:05  N0010 1:14:21
1:09:20  17:01:01  N0010 1:14:20      1:09:19  17:00:43  N0010 1:14:19
1:09:18  17:00:40  N0010 1:14:18      1:09:17  17:00:31  N0010 1:14:17
1:05:16  03:00:26  N0010 1:15:06      1:05:15  03:00:20  N0010 1:15:15
1:05:14  03:00:09  N0010 1:15:14      1:05:13  03:00:06  N0010 1:15:13
1:05:12  03:00:03  N0010 1:15:12      1:05:12  03:00:01  N0010 1:15:11
                          DATE: SEP-26-1993
CHAN:    TIME:     BUMPER:            CHAN:    TIME:     BUMPER:
1:07:18  23:10:34  N0010 1:16:18      1:07:17  23:10:30  N0010 1:16:17
1:07:16  23:10:24  N0010 1:16:16      1:07:15  23:10:20  N0010 1:16:15
1:07:14  23:10:09  N0010 1:16:14      1:07:13  23:10:06  N0010 1:16:13
1:07:12  23:10:04  N0010 1:16:12      1:07:11  23:10:00  N0010 1:16:11
1:07:10  22:00:01  N0010 1:16:10      1:07:09  21:40:58  N0010 1:16:09
1:07:08  21:40:52  N0010 1:16:08      1:07:07  21:40:50  N0010 1:16:07
1:07:06  21:40:20  N0010 1:16:06      1:07:05  21:40:18  N0010 1:16:05
1:07:04  21:40:16  N0010 1:16:04      1:07:03  21:40:14  N0010 1:16:03
1:07:02  21:40:12  N0010 1:16:02      1:07:01  21:40:10  N0010 1:16:01
```

THE LAST 32 CHANNEL(S) - Number of channels bumped since alarm 27 was last cleared. If more than 32 disconnects occurred, the last 32 will be displayed.

DATE - Date of disconnect

CHAN - Nest:slot:channel number of disconnected channels

TIME - Time of disconnect (hour:minute:second)

BUMPER - Node number and nest:slot:channel number of bumping channel

Figure 5-49. Typical Alarm 27 Status Display (DSP ST ALM 27)

DISPLAY STATUS ALARM 33 (DSP ST ALM 33) COMMAND

The DSP ST ALM 33 command displays the out-of-service status for the X.50 DS-0 channels on the specified X.50 Server Module, Figure 5-50.

Command:

[NOD xxxx] DSP ST ALM 33[/C]

where: /C = clears the alarm 33 history.

```
N0010>DSP ST ALM 33
XS0 OOS:
     1:09:01     1:09:02     1:09:03     1:09:04     1:10:02     2:03:08
     2:03:09     2:03:10     2:03:11     2:03:12     2:03:13     2:03:14
     2:03:15     2:03:16     3:05:01     3:05:02     3:05:03     3:05:04
     3:05:05
```

XS0 OOS - X.50 DS-0 channels that are out-of-service

1:09:01 - Nest:slot:X.50 DS-0 channel number that is out-of-service

Figure 5-50. Typical Alarm 33 Status Display (DSP ST ALM 33)

DISPLAY INTEGRATED TRUNK BUNDLE STATUS (DSP ST BDL) COMMAND

The DSP ST BDL command displays dial-up service type, bit error rate, out-of-sync conditions, loopback status, and supervisory band frame counts for the specified integrated trunk bundle(s), Figure 5-51. The command displays the same results as a DSP ST DL command issued to an Integrated Trunk Module.

Command:

[NOD xxxx] DSP ST BDL **{*** *or* 1:ss:cc[-1:ss:cc]...**[**,1:ss:cc[-1:ss:cc]**]}**[*option*]

where *option* is one of the following:

/B = clears BER window
/C = clears counters

NOTE: *Issuing /B will disconnect channels if present BER is less than user-specified link error performance rate.*

The displayed bandwidth percentage used by the connections may differ slightly due to rounding method used on Interlink Module to Integrated Trunk Module intermachine links.

```
N0010>DSP ST BDL 1:10:1
LINK 1:10:01  ->NODE:0020 L04:01
LINK TYPE=008                DIAL TYPE=DIAL LINK
BER=VERY GOOD  WINDOWS=12/032
REMOTE BER=VERY GOOD
OOS=
LOOP=NL
FNS.=N/A
CONNECTIONS    :       5
PERCENT BW USED:      10 %
AVAILABLE BW   :  144800 BPS
VOICE BW USED  :    1600 BPS
DATA BW USED   :    7200 BPS
FS: 0043
FR: 0025
RT: 0000
NR: 0000
BS: 0012
OS: 0003
```

LINK 1:10:01 - Nest:slot:bundle number and online/offline status of Integrated Trunk Module, where:
1:ss:cc = Online module
1:ss:cc' = Offline module
*** =** If asterisk precedes link, integrated trunk is out-of-service.

Figure 5-51. Typical Integrated Trunk Bundle Status Display (DSP ST BDL) (Sheet 1 of 2)

->NODE:0020 L04:01 - Node number at destination of active intermachine link. Blank if intermachine link is inactive. Node number is followed by destination intermachine link slot:bundle number or slot number if Interlink Module.

LINK TYPE - Link type–when proprietary bundle is **in-service**, indicates the frame mode at which the intermachine link is operating. When proprietary bundle is **in loopback**, indicates the frame mode of the bundle in the node specified by the display command, where:

006 or **008 =** LINK/2+ System operating in frame mode 2

NOTE: DS-0 bandwidth contention channels should not be connected over intermachine links with a link type less than 008.

DIAL TYPE - Dial-up service type, where:

DIAL LINK = dial link

EXPANSION FOR 1:ss = Interlink Module expanded

EXPANSION FOR 1:ss:cc = Bundle expanded

LINKBACK FOR 1:ss = Interlink Module backed up

LINKBACK FOR 1:ss:cc = Bundle backed up

NONE = Nondial-up service

BER - Bit error rate condition, where:

PEND = Bit error rate test is in progress, or Integrated Trunk Module never synchronized to an integrated trunk.

VERY GOOD = Test passed; BER better than $1x10^{-5}$

GOOD = Test passed; BER between $1x10^{-5}$ and $1x10^{-4}$

FAIR = Test passed; BER between $1x10^{-4}$ and $1x10^{-3}$

POOR = Test failed; BER worse than $1x10^{-3}$

WINDOWS - The ratio of full BER windows to total number of BER windows is displayed on the same line as the BER. If all BER windows are full, the window information is not displayed. The total number of BER windows depends on data rate:

Data Rate	Number of BER Windows
448 kbps and greater	32 windows
Greater than 192 kbps and less than 448 kbps	80 windows
192 kbps and below	160 windows

BER level changes are not checked and updated each time a window is updated, but only for window transition periods. This results in a delay in updating BER levels.

REMOTE BER - Remote bit error rate. N/A indicates integrated trunk is in loopback, or remote node has an earlier firmware revision that does not provide this information.

OOS - Out-of-sync condition, where:

L = Local node is out-of-sync.

R = Remote node is out-of-sync.

LR = Both ends of integrated trunk are out-of-sync. (ROS must have been detected prior to LOS.)

blank = Link is synchronized.

LOOP - Loopback status of integrated trunk (See Appendix A, Error and Status Messages, for messages.) Loopback time is also displayed.

FNS.= N/A - EIA functions: not applicable (Not applicable for integrated trunk)

CONNECTIONS - Number of channel connections

PERCENT BW USED - Percent bandwidth used by the connections

AVAILABLE BW - Available bandwidth, in bps

VOICE BW USED - Voice bandwidth used, in bps

DATA BW USED - Data bandwidth used, in bps

FS - Number of supervisory frames sent

FR - Number of supervisory frames received

RT - Number of supervisory frames retransmitted

NR - Number of negative acknowledgments sent. Indicates errors in supervisory data received.

BS - Number of bad sync characters received

OS - Number of out-of-sync conditions

NOTE: Error displays and counters are only cleared by a "/C" suffix to the DSP ST BDL command. "/B" suffix clears the BER test by clearing the windows. Issuing /B will disconnect channels if present BER is less than user-specified link error performance rate.

During bundle dialing and alignment, DSP ST BDL response indicates bundle is not connected since bundle and intermachine link status is not available yet. However, DSP DST DS0 response indicates that bundle is connected. Upon completion of dialing and bundle alignment, DSP ST BDL response will show bundle status.

Figure 5-51. Typical Integrated Trunk Bundle Status Display (DSP ST BDL) (Sheet 2)

DISPLAY BYPASS CHANNEL STATUS (DSP ST BP) COMMAND

The DSP ST BP command displays the status of the specified bypass channel(s), and clears phasor error history.

Command:

[NOD xxxx] DSP ST BP **{*** *or* ccc[-ccc]...**[**,ccc[-ccc]**]**
or 1:ss:ccc[-1:ss:ccc]...**[**,1:ss:ccc[-1:ss:ccc]**]}**

where: ccc = bypass channel number (1 to 511)

This command can also be entered as:

[NOD xxxx] DSP ST BP Nxxxx *
[NOD xxxx] DSP ST BP Nxxxx {n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]]}
[NOD xxxx] DSP ST BP Nxxxx {n:ss:cc[-n:ss:cc]…[,n:ss:cc[-n:ss:cc]]}
[NOD xxxx] DSP ST BP Nxxxx {n:ss:cc:sr[-n:ss:cc:sr]…[,n:ss:cc:sr[-n:ss:cc:sr]]}

where:	*	=	all originating or terminating channels
	n:ss:c	=	an originating or terminating I/O channel
	n:ss:cc	=	an originating or terminating DS-0 or X.50 DS-0 channel
	n:ss:cc:sr	=	an originating or terminating X.50 subrate channel

Each bypass channel displayed, Figure 5-52, represents a full duplex channel consisting of two separate connections, ORIG and TERM. These connections are completely independent of each other. If the connection of one of the bypass channel pair has not yet been established, the appropriate field will display an asterisk to indicate that the connection is pending.

```
N0010>DSP ST BP 1:18:1-1:18:10

SLOT 1:18     DEST                                  PHASOR  LOOP  CH TYPE  FNS.
CH 001 ORIG:  N0010  CHAN  1:07:01  CSP  07         14      OFF   SYNC     INBAND
       TERM:  N0010  CHAN  1:09:01  CSP  09         14

CH 002 ORIG:  N0010  CHAN  1:07:02  CSP  07         14      OFF   SYNC     INBAND
       TERM:  N0120  CHAN  1:07:01  LINK 05         14 ER

CH 003 ORIG:  N0120  CHAN  1:07:04  LINK 11         14      OFF   SYNC     INBAND
       TERM:  N0010  CHAN  1:07:04  CSP  07         14 ER

CH 004 ORIG:  N0250  CHAN  2:02:01  LINK 17         14      OFF   SYNC     INBAND
       TERM:  N0097  CHAN  2:02:01                 14

CH 005 ORIG:  N0002  CHAN  1:05:04  LINK 15         *
       TERM:  N0120  CHAN  1:05:04

CH 006 ORIG:  N0002  CHAN  1:04:02  LINK 11         *
       TERM:  N0120  CHAN  1:04:02  ILQ  03:01

004 IDLE CH(S) IN RANGE
```

SLOT 1:18 - Online Bypass Module

DEST - Destination information about the originator and terminator channels

CH 001 - Bypass channel number

ORIG: N0010 CHAN 1:07:01 - Node number and nest:slot:channel number of originator channel

CSP 07 - On ORIG line, displays slot location of Channelized Services Processor or Interlink Module or slot:bundle of Integrated Trunk Module that connects towards the **originator** node, where:

- **CSP =** Channelized Services Processor
- **ILQ =** Integrated Trunk Module
- **LINK =** Interlink Module
- **XSM =** X.50 Server Module

NOTE: An asterisk (*) indicates that the connection is pending.

PHASOR - Phasor size in bytes of bypass pair phasors, where:

- **ER =** Phasor error has occurred.

LOOP - Loopback status of Bypass Module, where:

- **OFF =** Bypass channel not in loopback
- **ON =** Bypass channel in bidirectional loopback

CH TYPE - Type of channel being bypassed, where:

- **ASYNC =** Quad Asynchronous Module channel
- **SYNC =** Synchronous, Isochronous, or Voice Module channel

FNS. - Mode of transmitting functions, in-band or out-of-band

TERM: N0010 CHAN 1:09:01 - Node number and nest:slot:channel number of terminator channel

CSP 09 - On TERM line, displays slot location of Channelized Services Processor or Interlink Module or slot:bundle of Integrated Trunk Module that connects towards the **terminator** node, where:

- **CSP =** Channelized Services Processor
- **ILQ =** Integrated Trunk Module
- **LINK =** Interlink Module
- **XSM =** X.50 Server Module

004 IDLE CH(S) IN RANGE - Number of idle channels in range selected

Figure 5-52. Typical Bypass Channel Status Display (DSP ST BP)

DISPLAY CHANNEL STATUS (DSP ST CH) COMMAND

The DSP ST CH command displays I/O channel condition and loopback status of all I/O channels in specified slot(s), Figure 5-53, and clears phasor error history.

Command:

[NOD xxxx] DSP ST CH **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP ST CH *
SLOT 1:10
CHANNEL   1       2       3       4
LOOPBK    NL      NL      NL      NL
STATUS    OK      OK      ERR     OK
VLPTIM    000     000     000     000
VPZPCM    --      --      --      --
VPZPRO    --      --      --      --
FAX ERR   ---     ---     ---     001
FAX SPD   ---     9600    14400   2400
```

SLOT 1:10 - Module slot location
CHANNEL - Channel number
LOOPBK - Loopback status of channels
STATUS - Channel status (cleared after displayed), where:
- **OK =** Channel is connected with no history of phasor error.
- **ERR =** Channel is connected with phasor error detected.
- **OFF =** Channel is disconnected.

VLPTIM - Loopback timeout (000-240 minutes)◊
VPZPCM - PCM phasor errors, where:◊
- **- - =** No errors
- **- U =** Receive underflow errors
- **- O =** Receive overflow errors
- **- B =** Receive underflow and overflow errors
- **U - =** Send underflow errors
- **O - =** Send overflow errors
- **B - =** Send underflow and overflow errors
- **UU =** Send and receive underflow errors
- **OO =** Send and receive overflow errors
- **BB =** Send and receive underflow and overflow errors

VPZPRO - Processed phasor errors, where:◊
- **- - =** No errors
- **- U =** Receive underflow errors
- **- O =** Receive overflow errors
- **- B =** Receive underflow and overflow errors
- **U - =** Send underflow errors
- **O - =** Send overflow errors
- **B - =** Send underflow and overflow errors
- **UU =** Send and receive underflow errors
- **OO =** Send and receive overflow errors
- **BB =** Send and receive underflow and overflow errors

FAX ERR - Number of failed fax connection attempts (cleared after displayed)§
FAX SPD - Fax speed (cleared after displayed when no fax transmission is in progress)§
Can be any of the following:

14400	9600	4800
12000	7200	2400

For EVM.3, FXO.3, and FXS.3 Modules, ACTIVE is displayed when fax transmission is in progress.
- - - indicates no fax activity

◊ = Only displayed when a Voice Server Module is installed in the node. Information is displayed in these fields if the channel is being processed by a Voice Server Module.

§ = Only displayed for EVM.2 channels

NOTE: See Appendix A, Error and Status Messages, for loopback status messages.
For a Quad Synchronous Processor channel, see Appendix A for additional channel status messages.

Figure 5-53. Typical Channel Status Display (DSP ST CH)

DISPLAY CLOCK STATUS (DSP ST CLK) COMMAND

The DSP ST CLK command displays the status of the digital PLL, nodal timing source, and multiple master clock.

Command:

[NOD xxxx] DSP ST CLK[/C]

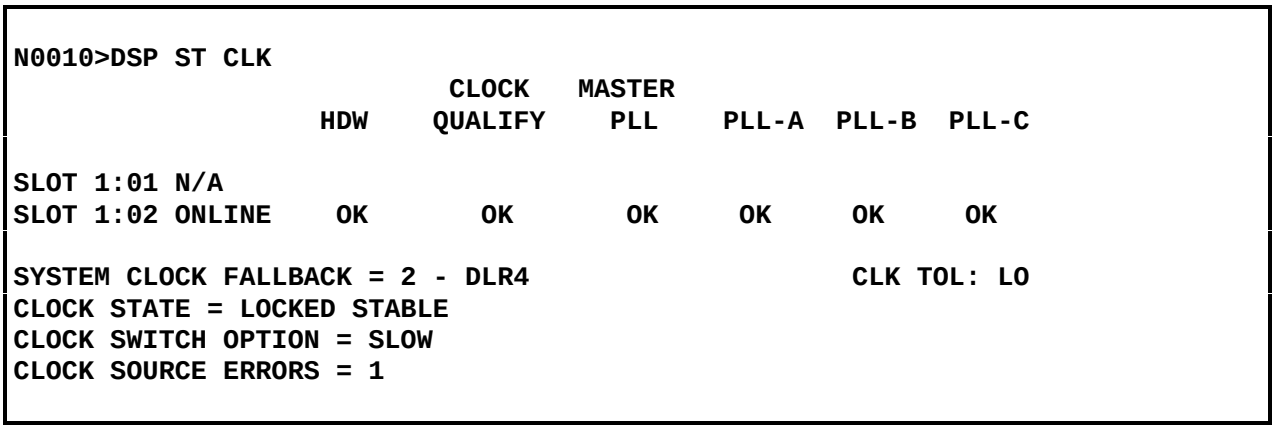
where: /C = clears all clock errors, alarm 5, and alarm 23 in the alarm queue

For a Network Module with a digital PLL daughterboard, the command displays the following:

- If no multiple master clocking nodes are defined, the digital PLL and nodal clock source status are displayed, Figure 5-54A.
- If a multiple master clocking node(s) is defined, the digital PLL, nodal clock source, and multiple master clock status are displayed, Figure 5-54B.

For a Network Module with an analog PLL daughterboard, the command displays the following:

- If a multiple master clocking node(s) is defined, the multiple master clock status is displayed, Figure 5-54C.
- If no multiple master clocking nodes are defined or no analog PLL is being used, the message "NO INFORMATION AVAILABLE" is displayed.


N0010>DSP ST CLK
CLOCK MASTER
HDW QUALIFY PLL PLL-A PLL-B PLL-C
SLOT 1:01 N/A
SLOT 1:02 ONLINE OK OK OK OK OK OK
SYSTEM CLOCK FALLBACK = 2 - DLR4 CLK TOL: LO
CLOCK STATE = LOCKED STABLE
CLOCK SWITCH OPTION = SLOW
CLOCK SOURCE ERRORS = 1

SLOT 1:01 (message) - Nest:slot location of primary or redundant Network Module followed by module status, where:
ONLINE = Module is online.
OFFLINE = Module is offline.
N/A = Module is not physically installed in the Mainframe or the INS command was not issued for the module.

HDW - PLL hardware status, where:
OK = No error exists
ERROR = Error condition exists

CLOCK QUALIFY - Clock qualifier circuit status, where:
OK = No error exists
ERROR = Error condition exists

MASTER PLL - Master PLL status, where:
OK = No error exists
ERROR = Error condition exists

PLL-A PLL-B PLL-C - PLL-A, -B, and -C status, where:
OK = No error exists
ERROR = Error condition exists

SYSTEM CLOCK FALLBACK - Current nodal timing source

CLK TOL - Clock qualification tolerance level, where:
HI = High tolerance frequency range
LO = Low tolerance frequency range

CLOCK STATE - Current nodal timing state (See Appendix A, Error and Status Messages, for current nodal timing states.)

CLOCK SWITCH OPTION - Clock switching option

CLOCK SOURCE ERRORS - Nodal clock source errors (Use the /C modifier or CLR AQ command to clear the current errors.)

A. NETWORK MODULE WITH DIGITAL PLL, NO MULTIPLE MASTER CLOCKING NODES

Figure 5-54. Typical Clock Status Display (DSP ST CLK) (Sheet 1 of 3)

```
N0010>DSP ST CLK
                          CLOCK   MASTER
                   HDW    QUALIFY    PLL    PLL-A  PLL-B  PLL-C

SLOT 1:01 N/A
SLOT 1:02 ONLINE    OK       OK       OK     OK     OK     ERROR

SYSTEM CLOCK FALLBACK = 2 - DLR5                    CLK TOL: LO
CLOCK STATE = DELAY FALLBACK
CLOCK SWITCH OPTION = QUICK
CLOCK SOURCE ERRORS = 1

MASTER CLOCKING NODE, PRIORITY = 01 [ASSERTING MASTER MODE]
MASTER CLK LIST: 0011,0025,0034,0067,0120,0132,0145,0169,
                 0172,0180,0193,0200,0215,0225,0252

            CLK  LAST                   CLK  LAST
PRIOR  NODE TYPE RESP      PRIOR  NODE TYPE RESP
  01                         09   0169  EXP
  02   0011  DEP 2:00        10   0172  DEP 0:10
  03   0025  DEP 1:18        11   0180  DEP 5:00
  04   0034  DEP 0:30        12   0193  DEP 8:05
  05   0067  EXP             13   0200  EXP
  06   0120  DEP 3:08        14   0215  DEP 6:12
  07   0132  DEP 2:15        15   0225  DEP 7:00
  08   0145  DEP 4:10        16   0252  DEP 8:50
```

SLOT 1:01 (message) - Nest:slot location of primary or redundant Network Module followed by module status, where:
- **ONLINE =** Module is online.
- **OFFLINE =** Module is offline.
- **N/A =** Module is not physically installed in the Mainframe or the INS command was not issued for the module.

HDW - PLL hardware status, where:
- **OK =** No error exists
- **ERROR =** Error condition exists

CLOCK QUALIFY - Clock qualifier circuit status, where:
- **OK =** No error exists
- **ERROR =** Error condition exists

MASTER PLL - Master PLL status, where:
- **OK =** No error exists
- **ERROR =** Error condition exists

PLL-A PLL-B PLL-C - PLL-A, -B, and -C status, where:
- **OK =** No error exists
- **ERROR =** Error condition exists

SYSTEM CLOCK FALLBACK - Current nodal timing source

CLK TOL - Clock qualification tolerance level, where:
- **HI =** High tolerance frequency range
- **LO =** Low tolerance frequency range

CLOCK STATE - Current nodal timing state (See Appendix A, Error and Status Messages, for current nodal timing states.)

CLOCK SWITCH OPTION - Clock switching option

CLOCK SOURCE ERRORS - Nodal clock source errors (Use the /C modifier or CLR AQ command to clear the current errors.)

MASTER CLOCKING NODE, PRIORITY - Priority level of this master clocking node

[ASSERTING MASTER MODE] - Master mode message (See Appendix A, Error and Status Messages, for master mode messages.)

MASTER CLK LIST - Master clocking list

PRIOR - Priority level of node on master clocking list

NODE - Master clocking node on master clocking list

Figure 5-54. Typical Clock Status Display (DSP ST CLK) (Sheet 2)

CLK TYPE - Clock type of node on master clocking list, where:
IND = Independent clock source
DEP = Dependent clock source
EXP = Node has not responded for 9 minutes

LAST RESP - Time in minutes:seconds last clock message was received from the node on master clocking list

B. NETWORK MODULE WITH DIGITAL PLL AND MULTIPLE MASTER CLOCKING NODES

```
N0010>DSP ST CLK

MASTER CLOCKING NODE, PRIORITY = 01 [ASSERTING MASTER MODE]
MASTER CLK LIST: 0011

            CLK  LAST                    CLK  LAST
PRIOR  NODE TYPE RESP      PRIOR  NODE TYPE RESP
  01                         09
  02   0011  DEP 2:00        10
  03                         11
  04                         12
  05                         13
  06                         14
  07                         15
  08                         16
```

MASTER CLOCKING NODE, PRIORITY - Priority level of this master clocking node
[ASSERTING MASTER MODE] - Master mode message (See Appendix A, Error and Status Messages, for master mode messages.)
MASTER CLK LIST - Master clocking list
PRIOR - Priority level of node on master clocking list
NODE - Master clocking node on master clocking list

CLK TYPE - Clock type of node on master clocking list, where:
IND = Independent clock source
DEP = Dependent clock source
EXP = Node has not responded for 9 minutes

LAST RESP - Time in minutes:seconds last clock message was received from the node on master clocking list

C. NETWORK MODULE WITH ANALOG PLL AND MULTIPLE MASTER CLOCKING NODES

Figure 5-54. Typical Clock Status Display (DSP ST CLK) (Sheet 3)

DISPLAY D-CHANNEL MODULE STATUS (DSP ST DCM) COMMAND

The DSP ST DCM command displays the operating status of the D-Channel Module including the ISDN protocol layer 2 and layer 3 performance parameter statistics of the D-Channel Module and also displays the B-channel, H0-channel, and D-channel connection status, Figure 5-55.

Command:

[NOD xxxx] DSP ST DCM **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**[/C]

where: /C = clears the statistics

```
N0097>DSP ST DCM 1:15-1:17
DCM 1:15  - ONLINE SINCE  12:55:55  DATE: TUE AUG-24-1993  SWITCH: 4/5ESS
D-CHANNEL:  CONNECTED TO 1:09:16    PHASOR: OK
               ---- LAYER 3 STATISTICS: ----
ABNORMAL FAILURES         :     1    PROTOCOL DISCRIM ERRORS   :     3
XMITTED STATUS MESSAGES   :     0    CALL REF NUMBER ERRORS    :     0
REC MESSAGES TOO SHORT    :     0    CALL REF FLAG ERRORS      :     0
               ---- LAYER 2 STATISTICS: ----
RECEIVED FRAMES FCS ERROR :     0    DATA LINK LAYER RESETS    :     0
RETRANSMITTED FRAMES      :    23    BUFFER OVERFLOWS          : *9999
                 ---- CHANNEL STATUS: ----
DS0        1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16
PHY MAP    6   2   3   -   -   -   -   -   -   -   -   -   -   -   -   -
LOG STATUS CON CON CON IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL DOK
PHY STATUS IDL CON CON IDL IDL CON CON CON CON CON CON CON CON IDL IDL DOK

DS0        17  18  19  20  21  22  23  24  25  26  27  28  29  30  31
PHY MAP    -   -   -   -   -   -   -   -   13  7   8   9   10  11  12
LOG STATUS IDL IDL PND PND IDL IDL IDL IDL CON CON CON CON CON CON CON
PHY STATUS IDL IDL NET NET IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL

DCM 1:16' - STANDBY SINCE 12:55:55  DATE: FRI AUG-20-1993  SWITCH: 4/5ESS

DCM 1:17  - INITIALIZING
```

DCM 1:15 - ONLINE SINCE - Nest:slot location of D-Channel Module and module status (ONLINE, STANDBY, INITIALIZING, or NOT CONNECTED)

12:55:55 - Time module came online

DATE - Date module came online

SWITCH - Switch type (4/5ESS, NTT, NUMERIS, ETSI, DMS250/100, or AUSTEL)

D-CHANNEL: CONNECTED TO 1:09:16 - Nest:slot:Integrated Trunk Module channel number

PHASOR - Phasor status, where:
OK = No phasor problem
ERROR = Over or underflow occurred

LAYER 3 STATISTICS - ISDN protocol layer 3 performance parameters

ABNORMAL FAILURES: 1 - Values following layer 3 performance parameters indicate error counts (0-9999)

LAYER 2 STATISTICS - ISDN protocol layer 2 performance parameters

RECEIVED FRAMES FCS ERROR: 0 - Values following layer 2 performance parameters indicate error counts (0-9999)

Figure 5-55. Typical D-Channel Module Status Display (DSP ST DCM) (Sheet 1 of 2)

***9999 -** Asterisk indicates layer 2 and layer 3 error counts exceeded 9999

CHANNEL STATUS - Channel status of B-channels and D-channel. If 24 DS-0 numbers are displayed, 1-23 are B-channels and 24 is the D-channel. If 31 DS-0 numbers are displayed, 1-15 and 17-31 are B-channels and 16 is the D-channel.

DS0 - Logical DS-0 numbers

PHY MAP - Physical DS-0 channel

LOG STATUS and PHY STATUS - Logical and physical channel connection status, where:
CON = Connected
DNK = D-channel not okay
DOK = D-channel okay
IDL = Idle
NET = B-channel negotiation
OOS = Out-of-service
PND = Pending
PRO = Disconnection in process
RES = Restart
Rnn = Retries, where nn = 00-63
RNG = Ringing

DCM 1:16' - Apostrophe indicates offline redundant D-Channel Module

NOTE: See Appendix A, Error and Status Messages, for layer 2 and layer 3 parameter descriptions.

Figure 5-55. Typical D-Channel Module Status Display (DSP ST DCM) (Sheet 2)

DISPLAY INTERMACHINE LINK STATUS (DSP ST DL) COMMAND

The DSP ST DL command displays bit error rate, out-of-sync conditions, satellite buffer status, loopback status, and supervisory band frame counts for the specified intermachine link(s), Figure 5-56, or integrated trunk bundle(s). The DSP ST DL command clears the BER window, clears counters, and clears satellite buffer phasor error history.

Command:

To issue the command to an Interlink Module, the command format is:

[NOD xxxx] DSP ST DL **{*** *or* ss[-ss]...**[**,ss[-ss]**]}**[*option*]

To issue the command to an Integrated Trunk Module, the command format is:

[NOD xxxx] DSP ST DL **{*** *or* 1:ss:cc[-1:ss:cc]...**[**,1:ss:cc[-1:ss:cc]**]}**[*option*]

where *option* is one of the following:

/B = clears BER window
/C = clears counters and satellite buffer phasor error history

NOTE: *Issuing /B will disconnect channels if present BER is less than user-specified link error performance rate.*

The displayed bandwidth percentage used by the connections may differ slightly due to rounding method used on Interlink Module to Integrated Trunk Module intermachine links.

For simplex intermachine link connections, the DSP ST DL command shows logical node translation status at the transmitting node only, not at the receiving node.

When a DSP ST DL command is issued to an Integrated Trunk Module, the command displays the same results as a DSP ST BDL command, Figure 5-51.

```
N0010>DSP ST DL 04
LINK 1:04  ->NODE:0020 L04 (LOGICAL NODE:0012 TRANS=FULL)
LINK TYPE=009
BER=VERY GOOD  WINDOWS=12/032
REMOTE BER=VERY GOOD
OOS=
SB=OK
LOOP=NL
FNS.=1001
CONNECTIONS    :       5
ASYMMETRICAL       TRANSMIT               RECEIVE
PERCENT BW USED:       6 %                   80 %
AVAILABLE BW   :  144800 BPS               7600 BPS
VOICE BW USED  :    1600 BPS               1600 BPS
DATA BW USED   :    7200 BPS             288000 BPS
FS: 0043
FR: 0025
RT: 0000
NR: 0000
BS: 0012
OS: 0003
```

LINK 1:04 - Slot location and online/offline status of Interlink Module, where:
1:ss = Online module
1:ss' = Offline module
*** =** An asterisk preceding link indicates that intermachine link is out-of-service.

->NODE:0020 L04 - Node number at destination of active intermachine link. Blank if intermachine link is inactive. Node number is followed by destination intermachine link slot number.
If destination node is LINK/100+, slot number is indicated by:
DLC:n:ss for nest and slot
or
DLC:n:ss:ck for nest, slot, and circuit

(LOGICAL NODE:0012 TRANS=FULL) - Logical node number and translation type

LINK TYPE - When intermachine link is **in-service**, indicates frame mode at which the intermachine link is operating.
When intermachine link is **inactive**, indicates frame mode of Interlink Module in the node specified by the display command, where:
009 = LINK/2+ System operating in asymmetrical mode
006 or **008 =** LINK/2+ System operating in frame mode 2
005 or **007 =** LINK/2+ System operating in frame mode 1
001 or **002 =** LINK/1 System

NOTE: DS-0 channels cannot be connected over intermachine links with a link type less than 005. DS-0 bandwidth contention channels should not be connected over intermachine links with a link type less than 008.

BER - Bit error rate condition, where:
PEND = Bit error rate test is in progress, or Interlink Module never synchronized to an intermachine link.
VERY GOOD = Test passed; BER better than $1x10^{-5}$
GOOD = Test passed; BER between $1x10^{-5}$ and $1x10^{-4}$
FAIR = Test passed; BER between $1x10^{-4}$ and $1x10^{-3}$
POOR = Test failed; BER worse than $1x10^{-3}$

Figure 5-56. Typical Intermachine Link Status Display (DSP ST DL) (Sheet 1 of 3)

WINDOWS - The ratio of full BER windows to total number of BER windows is displayed on the same line as the BER. The total number of BER windows depends on data rate:

Data Rate	Number of BER Windows
448 kbps and greater	32 windows
Greater than 192 kbps and less than 448 kbps	80 windows
192 kbps and below	160 windows

If all BER windows are full, the window information is not displayed. BER level changes are not checked and updated each time a window is updated, but only for window transition periods. This results in a delay in updating BER levels.

REMOTE BER - Remote bit error rate. N/A indicates intermachine link is in loopback, or remote node has an earlier firmware revision that does not provide this information.

OOS - Out-of-sync condition, where:
L = Local node is out-of-sync.
R = Remote node is out-of-sync.
LR = Both ends of intermachine link are out-of-sync. (ROS must have been detected prior to LOS.)
blank = Link is synchronized.

SB - Satellite buffer status (displayed only when satellite buffer option is present), where:
OK = Satellite buffer has not over/underflowed
ER = Satellite buffer has over/underflowed

LOOP - Loopback status of intermachine link (See Appendix A, Error and Status Messages, for messages.) Loopback time is also displayed.

FNS. - EIA functions (See Figure 5-57B) (Not applicable for integrated trunk)

CONNECTIONS - Number of channel connections

ASYMMETRICAL - Intermachine link mode of operation, where:
ASYMMETRICAL = Transmit and receive speeds are different.
SYMMETRICAL = Transmit and receive speeds are the same.
SIMPLEX = Data is either transmitted or received, but not both.
NOTE: Intermachine link mode of operation is not displayed for integrated trunk status.

PERCENT BW USED - Percent bandwidth used by the connections

AVAILABLE BW - Available bandwidth, in bps

VOICE BW USED - Voice bandwidth used, in bps

DATA BW USED - Data bandwidth used, in bps

FS - Number of supervisory frames sent

FR - Number of supervisory frames received

RT - Number of supervisory frames retransmitted

NR - Number of negative acknowledgments sent. Indicates errors in supervisory data received.

BS - Number of bad sync characters received

OS - Number of out-of-sync conditions

NOTE: Error displays and counters are only cleared by a "/C" suffix to the DSP ST DL command. "/B" suffix clears the BER test by clearing the windows. Issuing /B will disconnect channels if present BER is less than user-specified link error performance rate.

A. TYPICAL DSP ST DL DISPLAY

Figure 5-56. Typical Intermachine Link Status Display (DSP ST DL) (Sheet 2)

```
FNS.=1001
```

Where:

```
FNS.=1001
```

DSR SQ TM DCD

0 = DISABLED
1 = ENABLED

NOTE: Revision A Interlink Modules have SQ and TM displayed in reverse order.

EIA INPUT TO LINK/2+ SYSTEM	
Input	**Function**
DSR	Data set ready signal
SQ	Signal quality
TM	Test mode
DCD	Data carrier detect signal

```
FNS.=1001
```

Where, when using 64 kbps Bipolar Interface Module:

```
FNS.=1001
```

DCD LOS TM DCD

0 = DISABLED
1 = ENABLED

EIA INPUT TO LINK/2+ SYSTEM	
Input	**Function**
DCD	Data carrier detect signal
LOS	Loss of sync (frame) signal
TM	Test mode

B. TYPICAL DSP ST DL EIA FUNCTIONS DISPLAY

Figure 5-56. Typical Intermachine Link Status Display (DSP ST DL) (Sheet 3)

DISPLAY DS-0 CHANNEL STATUS (DSP ST DS0) COMMAND

The DSP ST DS0 command displays channel connect status, phasor error status, loopback status, and test tone status, Figure 5-57, and clears phasor error history for all DS-0 channels on the specified Voice Processor(s), Channelized Services Processor(s), and Integrated Trunk Module(s).

Command:

[NOD xxxx] DSP ST DS0 **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP ST DS0 *
ILP 1:15  1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16
CON ST    IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL IDL
BZ TIM    000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
PH ERR    NO  NO  NO  NO  NO  NO  NO  NO  NO  NO  NO  NO  NO  NO  NO  NO
LP STA    NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL
LP TIM    000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
TT STA    OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF
TT TIM    000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
VPZPCM    - - - - - - - O - O - O - - - - - - - - - - - - - - - - - - - -
VPZPRO    - - - - - - - - - - - - - - - - B - B - - - - U - - - B B - - -

ILP 1:15  17  18  19  20  21  22  23  24
CON ST    IDL IDL IDL IDL IDL IDL IDL IDL
BZ TIM    000 000 000 000 000 000 000 000
PH ERR    NO  NO  NO  NO  NO  NO  NO  NO
LP STA    NL  NL  NL  NL  NL  NL  NL  NL
LP TIM    000 000 000 000 000 000 000 000
TT STA    OFF OFF OFF OFF OFF OFF OFF OFF
TT TIM    000 000 000 000 000 000 000 000
VPZPCM    U U - B - - - B - B - - - B - -
VPZPRO    B - B - - - B - - - B - B - - -
```

ILP 1:15 - Module type (ILP, CSP, or ILQ), slot location, and channel number (1 to 24 for DS-1 facility, 1 to 31 for E-1 facility)

CON ST - Connection status, where:∆

- **CON =** Connected
- **PRO =** Disconnection in progress
- **IDL =** Idle (disconnected)
- **BSY =** Busied out (contending DS-0 channels only)
- **DIP =** Disconnection in progress (Integrated Trunk Module only)
- **INA =** Inactive (Integrated Trunk Module only)
- **PR =** Proprietary (Integrated Trunk Module only)
- **NPR =** Nonproprietary (Integrated Trunk Module only)

BZ TIM - Duration of busy time (contending DS-0 channels only), where:

- **1-24 =** 1 to 24 seconds
- **PRM =** Permanent)

PH ERR - Phasor error status (Voice Processor only), where:

- **NO =** No phasor error since last display or reset
- **YES =** Phasor error has occurred since last display or reset.

LP STA - Loopback status of channels, where:∆

- **BI =** Channel phasor in bidirectional loopback
- **EQ =** Channel phasor in loopback toward equipment

Figure 5-57. Typical DS-0 Channel Status Display (DSP ST DS0) (Sheet 1 of 2)

LP STA - Loopback status of channels (cont'd), where:Δ
EX = Channel in a loopback generated by an external source
LI = Channel phasor in loopback toward link network
NL = No loopback
RE = Channel at remote end in loopback toward equipment
RA = Remote Integrated Trunk Module analog loopback toward Interlink Module
RB = Remote Integrated Trunk Module bus loopback
RD = Remote Integrated Trunk Module digital loopback toward ILC Module
VS = Bidirectional loopback on associated V-channel

LP TIM - Loopback time remaining, where:Δ
001-240 = Minutes remaining before loopback is cleared automatically
PRM = Permanent, that is, loopback is not cleared automatically

TT STA - Test tone generator status (Voice Processor only), where:
OFF = Test tone generator is disabled.
EQ = Test tone generator enabled toward equipment
LI = Test tone generator enabled toward line

TT TIM - Test tone time remaining (Voice Processor only), where:
001-240 = Minutes remaining before test tone is cleared automatically
PRM = Permanent, that is, test tone is not cleared automatically

VPZPCM - PCM phasor errors, where:◊
- - = No errors
- U = Receive underflow errors
- O = Receive overflow errors
- B = Receive underflow and overflow errors
U - = Send underflow errors
O - = Send overflow errors
B - = Send underflow and overflow errors
UU = Send and receive underflow errors
OO = Send and receive overflow errors
BB = Send and receive underflow and overflow errors

VPZPRO - Processed phasor errors, where:◊
- - = No errors
- U = Receive underflow errors
- O = Receive overflow errors
- B = Receive underflow and overflow errors
U - = Send underflow errors
O - = Send overflow errors
B - = Send underflow and overflow errors
UU = Send and receive underflow errors
OO = Send and receive overflow errors
BB = Send and receive underflow and overflow errors

◊ = Only displayed when a Voice Server Module is installed in the node. Information is displayed in these fields if the channel is being processed by a Voice Server Module.

Δ = Integrated Trunk Module displays these fields only.

Figure 5-57. Typical DS-0 Channel Status Display (DSP ST DS0) (Sheet 2)

DISPLAY DS-1 CHANNEL STATUS (DSP ST DS1) COMMAND

The DSP ST DS1 command displays the following information for the specified Voice Processor(s), Channelized Services Processor(s), and Integrated Trunk Module(s):

- Alarm conditions
- Loopback status
- Test tone status (not available for Integrated Trunk Module)
- Carrier detect and test signal function status
- Local and remote loss of frame alignment signals (G.703 interface only)
- Local and remote loss of multiframe alignment signals (G.703 interface only)
- Number of DS-0 channel or bundle connections
- Number of CRC errors (Integrated Trunk Module only)

Command:

[NOD xxxx] DSP ST DS1 **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**[/C]

where: /C = clears existing frame buffer error in the display (Channelized Services Processor and Integrated Trunk Module only) and CRC errors (Integrated Trunk Module only)

See Figure 5-58 for a typical DS-1 trunk status display and Figure 5-59 for a typical E-1 trunk status display.

```
N0010>DSP ST DS1 1:11
ILP  1:11
ALARM : RED
LOOP : BI TIME = 007
TONE : OFF
FNS.:   CD = 1  TM = 1
CONNECTIONS : 00
```

NOTE: Display for Channelized Services Processor and Integrated Trunk Module also shows frame buffer status as "OK" or "ERROR". Display for Integrated Trunk Module also shows CRC4 errors.

ILP 1:11 - Module type (ILP, CSP, or ILQ) and slot location

ALARM - Alarm condition, where:
- **NONE =** No alarm
- **RED =** Red alarm
- **YEL =** Yellow alarm
- **RED/YEL =** Red and yellow alarm

LOOP - Loopback status, where:
- **BI =** DS-1 interface in bidirectional loopback
- **EQ =** DS-1 interface in loopback toward equipment
- **LI =** DS-1 interface in loopback toward LINK network
- **LK =** Local line driver in DS-1 loopback toward LINK network
- **LLB =** Local line driver in DS-1 loopback toward equipment
- **NL =** No loopback

TIME - Loopback time remaining, where:
- **001-240 =** Minutes remaining before loopback is cleared automatically
- **PRM =** Permanent, that is, loopback is not cleared automatically

TONE - Test tone generator status (does not appear for Integrated Trunk Module), where:
- **OFF =** Test tone generator is disabled.
- **EQ =** Test tone enabled toward equipment
- **LI =** Test tone enabled toward line

FNS.: CD - Status of carrier detect signal, where:
- **0 =** No carrier
- **1 =** Present

TM - Status of test mode, where:
- **0 =** Line driver not in loopback
- **1 =** Line driver in loopback

CONNECTIONS - Number of DS-0 channels connected (for Integrated Trunk Module, number of bundles connected)

Figure 5-58. Typical DS-1 Trunk Status Display (DSP ST DS1)

```
N0010>DSP ST DS1 1:11
ILP  1:11
ALARM : RED
* DISC ALARM *
LOOP : NL
TONE : OFF
FNS.:   CD = 1  TM = 0
LOSS OF FAS : NO
LOSS OF MFAS : NO
REMOTE LOSS OF FAS : NO
REMOTE LOSS OF MFAS : NO

RED ALARM - HIGH ERROR RATE
CONNECTIONS : 00
```

NOTE: Display for Channelized Services Processor and Integrated Trunk Module also shows frame buffer status as "OK" or "ERROR".

ILP 1:11 - Module type (ILP, CSP, or ILQ) and slot location

ALARM - Alarm condition, where:
- **NONE =** No alarm
- **RED =** Red alarm
- **YEL =** Yellow alarm
- **RED/YEL =** Red and yellow alarm

*** DISC ALARM * -** Indicates that one or more DS-0 channels have failed to connect (will only be displayed if that DS-0 channel has DSC ALM parameter enabled)

LOOP - Loopback status, where:
- **NL =** No loopback
- **EQ =** DS-1 interface in loopback toward equipment
- **LI =** DS-1 interface in loopback toward LINK network
- **BI =** DS-1 interface in bidirectional loopback
- **LK =** Local line driver in DS-1 loopback toward LINK network
- **LLB =** Local line driver in DS-1 loopback toward equipment

TONE - Test tone generator status (does not appear for Integrated Trunk Module), where:
- **OFF =** Test tone generator is disabled.
- **EQ =** Test tone enabled toward equipment
- **LI =** Test tone enabled toward line

FNS.: CD - Status of carrier detect signal, where:
- **0 =** No carrier
- **1 =** Present

TM - Status of test mode, where:
- **0 =** Line driver not in loopback
- **1 =** Line driver in loopback

LOSS OF FAS - Local loss of frame alignment signal

LOSS OF MFAS - Local loss of multiframe alignment signal

REMOTE LOSS OF FAS - Remote loss of frame alignment signal

REMOTE LOSS OF MFAS - Remote loss of multiframe alignment signal

RED ALARM - Red alarm message (will only be displayed if the error rate is exceeded)

CONNECTIONS - Number of DS-0 channels connected (for Integrated Trunk Module, number of bundles connected)

Figure 5-59. Typical E-1 Trunk Status Display (DSP ST DS1)

DISPLAY LINK FRAMING MODULE STATUS (DSP ST LFM) COMMAND

The DSP ST LFM command displays the status and history of the specified LFM.3, LFM.10, LFM.11, LFM.12, or LFM.14 Link Framing Module(s), Figure 5-60, and clears the history and CRC error counters.

Command:

[NOD xxxx] DSP ST LFM **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**[*option*]

where *option* is one of the following:

/A = displays only Link Framing Modules with a history of red or yellow alarms (LFM.3, LFM.10, LFM.11, LFM.12) or out-of-service condition (LFM.14)
/C = clears history and CRC error counters

```
N0010>DSP ST LFM 1:7

LFM.3  1:07  PROGRAMMABLE:   NO

       FAC 1 - RED ALARM:       NO /NO
       FAC 1 - YELLOW ALARM:    NO /NO
       FAC 1 - LOSS OF MFA:     NO /NO
       FAC 1 - FRAME ERROR(SQ):NO /NO
       FAC 1 - CARRIER DETECT: YES/YES
       FAC 1 - CRC ERRORS:      6116

       FAC 1 - ASSOCIATED DL:
```

LFM.3 - Link Framing Module type
1:07 - Nest:slot location
PROGRAMMABLE - Some parameters are software or DIP switch programmable, where:
NO = DIP switch
YES = Software
FAC 1 - Facility 1
RED ALARM: **-** Red alarm received (NO or YES)
NO /NO - History/status field. Left field indicates whether at least one error has occurred since the last DSP ST LFM/C command was issued. Right field indicates present operating status.
YELLOW ALARM - Yellow alarm received (NO or YES)
LOSS OF MFA - Loss of multiframe alignment (NO or YES)
FRAME ERROR(SQ): **-** Signal quality error (NO or YES)
CARRIER DETECT - Carrier detected (NO or YES)
CRC ERRORS - Cyclic redundancy check (0000-9999)
ASSOCIATED DL - Interlink Module slot number that has Link Framing Module defined in LFM slot field (blank if LFM slot has not been defined)

A. TYPICAL LFM.3 LINK FRAMING MODULE STATUS DISPLAY

Figure 5-60. Typical Link Framing Module Status Displays (DSP ST LFM) (Sheet 1 of 3)

```
N0010>DSP ST LFM 1:11

LFM.12 1:11  PROGRAMMABLE:  YES       MODE OF OPERATION:  2 TO 2

       FAC 1 - RED ALARM:      YES/YES     FAC 2 - RED ALARM:      YES/YES
       FAC 1 - YELLOW ALARM:   NO /NO      FAC 2 - YELLOW ALARM:   NO /NO
       FAC 1 - SIGNAL LOSS:    NO /NO      FAC 2 - SIGNAL LOSS:    YES/NO
       FAC 1 - TX ALL ZEROES:  NO /NO      FAC 2 - TX ALL ZEROES:  NO /NO
       FAC 1 - FAC. LOOPBACK:  NO /NO      FAC 2 - FAC. LOOPBACK:  NO /NO
       FAC 1 - CRC ERRORS:           0     FAC 2 - CRC ERRORS:           1

       LFM A - TX FIFO ERROR:  NO /NO
       LFM A - RX FIFO ERROR:  NO /NO
       LFM A - ASSOCIATED DL:  04

       LFM B - TX FIFO ERROR:  NO /NO
       LFM B - RX FIFO ERROR:  NO /NO
       LFM B - ASSOCIATED DL:  05
```

LFM.12 - Link Framing Module type
1:11 - Nest:slot location
PROGRAMMABLE - Parameters are software or DIP switch programmable, where:
NO = DIP switch
YES = Software
MODE OF OPERATION - Mode of operation (2 TO 2, 2 TO 1, 1 TO 1)
FAC 1 - Facility 1
RED ALARM: **-** Red alarm received
YES/YES - History/status field. Left field indicates whether at least one error has occurred since the last DSP ST LFM/C command was issued. Right field indicates present operating status.
FAC 2 - Facility 2 (displayed for 2-to-2 mode of operation only)
YELLOW ALARM - Yellow alarm received
SIGNAL LOSS - Carrier signal loss
TX ALL ZEROES - Transmitting all zeroes (>63 bits of 0)
FAC. LOOPBACK - Facility in loopback
CRC ERRORS - Cyclic redundancy check
LFM A - Status of first port
TX FIFO ERROR - Transmit buffer over/underflow
RX FIFO ERROR - Receive buffer over/underflow
ASSOCIATED DL - Interlink Module slot number that has Link Framing Module defined in LFM slot field (blank if LFM slot has not been defined)
LFM B - Status of second port (displayed for 2-to-1 and 2-to-2 modes of operation)

NOTE: The display differs according to the mode of operation. Facility 1 (FAC 1) and Facility 2 (FAC 2) (2-to-2 mode of operation only) indicate data associated with the DS-1 trunk attached to rear panel connectors B and D. Link Framing Module connection B (LFM B) is displayed for 2-to-1 and 2-to-2 modes of operation.

B. TYPICAL LFM.12 LINK FRAMING MODULE STATUS DISPLAY

Figure 5-60. Typical Link Framing Module Status Displays (DSP ST LFM) (Sheet 2)

```
N0010>DSP ST LFM 1:13

LFM.14 1:13  PROGRAMMABLE:  YES

       FAC 1 - RX R.A.I.:      NO /NO      FAC 1 - SIGNAL LOSS:    NO /NO
       FAC 1 - RX A.I.S.:      NO /NO      FAC 1 - OUT OF SERVICE: YES/YES
       FAC 1 - FAC. LP LK/LA : NO /NO      FAC 1 - OUT OF M-FRAME: NO /NO
       FAC 1 - FAC. LP LLB:    NO /NO
       FAC 1 - CRC-5 ERRORS:     2020*

       LFM A - SIGNAL LOSS:    NO /NO      LFM B - SIGNAL LOSS:    NO /NO
       LFM A - RX FIFO ERROR:  YES/YES     LFM B - RX FIFO ERROR:  YES/YES
       LFM A - TX FIFO ERROR:  YES/YES     LFM B - TX FIFO ERROR:  YES/YES

       LFM C - SIGNAL LOSS:    NO /NO      LFM D - SIGNAL LOSS:    NO /NO
       LFM C - RX FIFO ERROR:  YES/YES     LFM D - RX FIFO ERROR:  YES/YES
       LFM C - TX FIFO ERROR:  YES/YES     LFM D - TX FIFO ERROR:  YES/YES

       LFM A - ASSOCIATED SLOT:04
       LFM B - ASSOCIATED SLOT:06
       LFM C - ASSOCIATED SLOT:08
       LFM D - ASSOCIATED SLOT:10
```

LFM.14 - Link Framing Module type
1:13 - Nest:slot location
PROGRAMMABLE - Parameters are software programmable. No DIP switch settings are required.
FAC 1 - Facility 1
RX R.A.I. - Receive remote alarm indication
NO /NO - History/status field. Left field indicates whether at least one error has occurred since the last DSP ST LFM/C command was issued. Right field indicates present operating status.
SIGNAL LOSS - Facility carrier signal loss
RX A.I.S. - Receive alarm indication signal
OUT OF SERVICE - Out of service condition. Occurs when either signal loss, receive alarm indication signal, receive remote alarm indication, or loss of multiframe alignment has been detected for more than 2 seconds.
FAC. LP LK/LA - Facility in loopback toward LINK/2+ node
OUT OF M-FRAME - Loss of multiframe alignment
FAC. LP LLB - Facility in loopback toward trunk
CRC-5 ERRORS - Number of cyclic redundancy check errors
2020* - Asterisk indicates CRC-5 overflow.
LFM A - SIGNAL LOSS - Module carrier signal loss
LFM A - RX FIFO ERROR:- Module receive FIFO errors
LFM A - TX FIFO ERROR - Module transmit FIFO errors
LFM A - ASSOCIATED SLOT - Interlink or Integrated Trunk Module slot number associated with LFM connector A
LFM B - ASSOCIATED SLOT - Interlink or Integrated Trunk Module slot number associated with LFM connector B
LFM C - ASSOCIATED SLOT - Interlink or Integrated Trunk Module slot number associated with LFM connector C
LFM D - ASSOCIATED SLOT - Interlink or Integrated Trunk Module slot number associated with LFM connector D

C. TYPICAL LFM.14 LINK FRAMING MODULE STATUS DISPLAY

Figure 5-60. Typical Link Framing Module Status Displays (DSP ST LFM) (Sheet 3)

DISPLAY BROADCAST/POLLING STATUS (DSP ST POL) COMMAND

The DSP ST POL command displays streaming data errors and constant space errors for the specified broadcast/polling member(s), Figure 5-61.

Command:

[NOD xxxx] DSP ST POL **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/C]

where: /C = clears all errors and reenables the channel

```
N0010>DSP ST POL 1:11:1-1:11:4

                          STREAMING DATA    CONSTANT SPACES
POLL CHAN 1:11:01               OK                OK
POLL CHAN 1:11:02               OK                OK
POLL CHAN 1:11:03               OK                OK
POLL CHAN 1:11:04               OK                OK
```

POLL CHAN 1:11:01 - Nest:slot:channel number of broadcast/polling group member

STREAMING DATA - Streaming data error condition, where:
- **ERROR =** Streaming data error is present and channel is locked out of the broadcast/polling group.
- **N/A =** Anti-streaming timer is off.
- **OK =** No streaming data error is present.

CONSTANT SPACES - Constant spaces error condition, where:
- **ERROR =** Constant spaces error is present and channel is locked out of the broadcast/polling group.
- **N/A =** Spacing alarm is disabled.
- **OK =** No constant spaces error is present.

Figure 5-61. Typical Broadcast/Polling Status Display (DSP ST POL)

DISPLAY QUALITY STATUS (DSP ST QUA) COMMAND

The DSP ST QUA command displays a 24-hour history of errors and severe errors for the Voice Processor(s) and Channelized Services Processor(s) specified, Figure 5-62.

Command:

[NOD xxxx] DSP ST QUA **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**[/C]

where: /C = clears the data after data is displayed

```
N0010>DSP ST QUA 1:5

ILP  1:05
TIME: 15:19:10  DATE: THU AUG-05-1993
CURRENT SAMPLING INTERVAL - 1 SECOND

SEVERE ERRORS IN  4  15-MINUTE INTERVALS:     0     0     0     0
SEVERE ERRORS IN  24  1-HOUR INTERVALS:
    0   192*    2     5     0     0     0     0     0     0     0     0
    0     0     0     0     0     1   N/A   N/A   N/A   N/A   N/A   N/A
TOTAL SEVERE ERRORS OVER 24 HOURS:    200
SEVERE ERROR THRESHOLD EXCEEDED
SEVERE ERROR THRESHOLD FIRST EXCEEDED AT
TIME: 11:48:50  DATE: THU AUG-05-1993

ERRORS IN  4  15-MINUTE INTERVALS:            0     0     0     0
ERRORS IN  24  1-HOUR INTERVALS:
    0   238*   31   190     0     0     0     0     0     0     0     0
    0     0     0     0     0     5   N/A   N/A   N/A   N/A   N/A   N/A
TOTAL ERRORS OVER 24 HOURS:           464
ERROR THRESHOLD EXCEEDED
ERROR THRESHOLD FIRST EXCEEDED AT
TIME: 11:28:06  DATE: THU AUG-05-1993
```

ILP 1:05 - Voice Processor location (CSP location is displayed when the DSP ST QUA command is issued for a Channelized Services Processor.)

TIME - Current time

DATE - Current date

CURRENT SAMPLING INTERVAL - Quality sample interval

SEVERE ERRORS IN 4 15-MINUTE INTERVALS - Severe error 15-minute test period results

SEVERE ERRORS IN 24 1-HOUR INTERVALS - Severe error 1-hour test period results, where:

N/A = Specified interval has not been reached. (Will take 24 hours for all N/As to be removed and replaced with data)

*** =** During specified interval, a red or yellow alarm occurred.

TOTAL SEVERE ERRORS OVER 24 HOURS - Total number of severe errors

SEVERE ERROR THRESHOLD EXCEEDED - Severe error message (displayed when severe error threshold is exceeded)

SEVERE ERROR THRESHOLD FIRST EXCEEDED AT - Time and date of first severe error (displayed when severe error threshold is exceeded)

ERRORS IN 4 15-MINUTE INTERVALS - Error 15-minute test period results

ERRORS IN 24 1-HOUR INTERVALS - Error 1-hour test period results, where:

N/A = Specified interval has not been reached. (Will take 24 hours for all N/As to be removed and replaced with data)

*** =** During specified interval, a red or yellow alarm occurred.

TOTAL ERRORS OVER 24 HOURS - Total number of errors

ERROR THRESHOLD EXCEEDED - Error message (displayed when error threshold is exceeded)

ERROR THRESHOLD FIRST EXCEEDED AT - Time and date of first error (displayed when error threshold is exceeded)

Figure 5-62. Typical Quality Status Display (DSP ST QUA)

DISPLAY SYSTEM STATUS (DSP ST SY) COMMAND

The DSP ST SY command displays phase locked loop and clock source error conditions, Driver and Power Supply Module status, gateway capability, and other status information, Figure 5-63, for the node.

The DSP ST SY command also displays the modules that are defined and physically inserted in each slot. A module is defined when channel parameters for any channel on that module are defined. A module is physically inserted when the module is installed in the Mainframe and the INS command is issued for that module.

Command:

[NOD xxxx] DSP ST SY[/T]

where: /T = truncates display—shows system status information but does not display defined/physical status of modules

```
N0010>DSP ST SY
ONLINE SINCE 12:29:27  DATE: FRI JUL-16-1993
SP GATEWAY= ON
SP USER STATUS= GATEWAY
RELAY STATUS= OFF
BYPASS CHANS= 010
DAT/FUN/MON TEST= ML 1:13:1->1:13:2
SYSTEM CLOCK FALLBACK= 2 (DS1 1:15)
P.L.L. ERRORS=
CLOCK SOURCE ERRORS= 1
DRIVER CARD STATUS    NEST 1: DRC2  NEST 2: DRE2  NEST 3: DRE2
             EVEN:         ON/GOOD     OFF/FAIL        ON/GOOD
              ODD:        OFF/GOOD      ON/GOOD       OFF/GOOD
             P.S.:            GOOD         FAIL           GOOD

NODE:0010
SLOT  DB   HW       SLOT  DB   HW       SLOT  DB   HW       SLOT  DB   HW
1:01     /NCL-A     1:02     /NCL-A'    1:03  ILC/ILC.2S    1:04  ILC/ILC.2S'
1:05  ILC/ILC.2     1:06  ILC/ILC.2'    1:07  VSM/VSM.5     1:08     /DTU.2
1:09     /BPM       1:10     /BPM'      1:11  LFM/LFM.12    1:12  CSP/CSP
1:13  ILP/ILP       1:14  ILQ/ILQ.11    1:15  XSM/XSM       1:16  XSM/XSM'
1:17  QSP/QSP       1:18  VSM/VSM       2:01  QSC/QSC.1     2:02  QSC/QSC.1
2:03  XSM/XSM~      2:04  XSM/XSM       2:05  QVM/QVM       2:06  QVM/QVM
2:07  QVM/QVM       2:08  QVM/QVM       2:09  QVM/QVM       2:10  QVM/QVM
2:11  QVM/QVM       2:12  QVM/QVM       2:13  QVM/QVM       2:14  QVM/QVM
2:15  QVM/QVM.2     2:16  QVM/QVM.2     2:17  EVM/EVM       2:18  QSP/QSP.3
3:01  DSC/DSC.2     3:02  DSC/DSC.2     3:03  DSC/DSC.4     3:04  DSC/DSC.4
3:05  FXO/FXO       3:06  FXS/FXS       3:07  ICM/ICM.3     3:08  DCM/DCM
3:09  QSC/QSC       3:10     /          3:11     /          3:12     /
3:13     /          3:14     /          3:15     /          3:16     /
3:17     /          3:18     /
```

NOTE: QSC.3 is displayed for Subrate Channel Processors.
QSC.5 is displayed for QVC Voice Modules.
NCL, DTU, LFM, LFM.1, and BPM Modules should not have any entry in the DB column.
An ILC with an S suffix is displayed for Interlink Modules with a satellite buffer option installed.
HW column for ILQ Module displays ILQ Module type and BIM Module type combined. For example, ILQ.11 is displayed for ILQ.1 Module with BIM.1 Module.
HW column for ILQ Module displays a question mark if the watchdog timer has expired.
HW column for XSM Module displays tilde for offline primary module and apostrophe for offline redundant module. If no apostrophe, the XSM Module is an online primary or redundant module.

ONLINE SINCE - Online status, indicates the time and date the node was last reset.

SP GATEWAY - Supervisory port gateway status, where:

ON = Supervisory port gateway enabled
OFF = Supervisory port gateway disabled

Figure 5-63. Typical System Status Display (DSP ST SY) (Sheet 1 of 2)

SP USER STATUS - Supervisory port user status (only displayed when password 1 and password 2 are defined), where:

GATEWAY = User logged on with password 2

NONGATEWAY = User logged on with password 1

NOT LOGGED IN = Displayed when DSP ST SY command is issued to a remote node that has password protection but is presently logged off

NOTE: Supervisory port user status will not be displayed after passwords are defined, until the user logs off and logs on again.

RELAY STATUS - Alarm relay status, where:

ON = Alarm relay test enabled

OFF = Alarm relay test disabled

BYPASS CHANS - Number of bypass channels currently being used

DAT/FUN/MON TEST - Channel in test or channel monitored by other channel, where:

LL = Local channel in test (TST L)

RL = Local channel in test (TST R)

ML = Local channel monitored by other local channel (MON L)

MR = Local channel monitored by other local channel (MON R)

1:13:1-> - When monitoring, ML or MR channel that is sending monitored data.
When testing, LL or RL channel that is under test.

1:13:2 - Channel that is monitoring data (blank when testing)

SYSTEM CLOCK FALLBACK - System clock source

NOTE: "SLAVE HOLDOVER" is displayed when a clock source failure has occurred and the PLL output is being held at the previous clock frequency accuracy while attempting to validate and lock to a new clock source.

"DEFAULT INTERNAL" is displayed to indicate the active master node is locked to the default internal clock and will continue to search for an independent clock source.

P.L.L. ERRORS - Phase locked loop errors, where:

A = Phase locked loop A is not locked.

B = Phase locked loop B is not locked.

C = Phase locked loop C is not locked.

M = Master phase locked loop failed to lock to the internal clock.

Q = Clock qualifier error

W = Phase locked loop hardware error

CLOCK SOURCE ERRORS - Clock source errors, where:

1 = Clock fallback 1 (primary) was lost or interrupted.

2 = Clock fallback 2 was lost or interrupted.

3 = Clock fallback 3 was lost or interrupted.

DRIVER CARD STATUS - Status of Driver Modules

P.S. - Status of Power Supply Module(s)

NODE - Node number of LINK/2+ System where command is executed

SLOT - Nest:slot location of module

DB - Displays module type that is defined in the database for each slot position

HW - Displays module type that is physically installed in each slot position. Apostrophe indicates offline module of a redundant pair.
For Network Module, PLL type is indicated in the HW column, where:

NCL* = Enhanced digital PLL daughterboard (Release 9 and higher only)

NCL+ = Digital PLL daughterboard with on-board stratum 3 accurate oscillator

NCL- = Analog PLL daughterboard

NCL? = No PLL daughterboard is present on Network Module

Figure 5-63. Typical System Status Display (DSP ST SY) (Sheet 2)

DISPLAY VOICE SERVER MODULE CHANNEL STATUS (DSP ST VCH) COMMAND

The DSP ST VCH command displays the associated I/O channels as well as the loopback status, phasor errors, facsimile (fax) connection attempt errors, and fax speed of the specified V-channels, Figure 5-64.

Command:

[NOD xxxx] DSP ST VCH **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

where: cc = VSM/VSM.1 channel (1-31), VSM.3A channel (1-8), VSM.3B channel (1-16), or VSM.5 channel (1-12)

```
N1290>DSP ST VCH 1:05:01-1:09:31

VSM.3B 1:05
VCHN     IO        LOOP     VPZPCM   VPZPRO   FAX ERR  FAX SPEED
1:05:01  1:09:01   OFF      --       --       ---      ---
1:05:02F 1:14:02   OFF      --       --       ---      ---
1:05:03  1:14:03   OFF      U-       -B       001      9600  (V.17)
1:05:04  1:14:04   023      --       --       000      9600  (V.17)
1:05:05  BUSY
1:05:07  UNAVAIL
1:05:08  1:15:01   OFF      BB       O-       009      2400  (V.27)
1:05:09  1:15:02*  OFF      --       --       ---      ---
1:05:15  1:15:03   OFF      --       --       ---      MODEM N/A

VSM.3A 1:08

VSM.5  1:09
VCHN     IO        LOOP     VPZPCM   VPZPRO   FAX ERR  FAX SPEED
1:09:01  1:12:01   OFF      --       --       ---      ---
1:09:02  1:12:02   OFF      -U       --       ---      2400  (V.26 STU)
1:09:03  1:12:03   OFF      --       --       ---      ---
1:09:04  1:12:04   OFF      --       --       ---      4800  (V.32 STU)

RANGE SUMMARY -  CONNECTED:11  IDLE:25
```

VSM.3B 1:05 - Module type and nest:slot location of Voice Server Module (when no module status information is displayed, module is online but no channels are connected)

VCHN - Nest:slot:channel number of connected Voice Server Module channel. An F following the V-channel number indicates the channel has failed.

IO - Nest:slot:channel number of connected input/output channel. An asterisk after the I/O channel indicates a pending state. The V-channel is connected but associated I/O channel has not yet received end-to-end acknowledgment and is therefore not fully connected.

LOOP - Loopback status/timeout

Figure 5-64. Typical Voice Server Module Channel Status Display (DSP ST VCH) (Sheet 1 of 2)

VPZPCM - PCM phasor errors, where:
- **- - =** No errors
- **- U =** Receive underflow errors
- **- O =** Receive overflow errors
- **- B =** Receive underflow and overflow errors
- **U - =** Send underflow errors
- **O - =** Send overflow errors
- **B - =** Send underflow and overflow errors
- **UU =** Send and receive underflow errors
- **OO =** Send and receive overflow errors
- **BB =** Send and receive underflow and overflow errors

VPZPRO - Processed phasor errors, where:
- **- - =** No errors
- **- U =** Receive underflow errors
- **- O =** Receive overflow errors
- **- B =** Receive underflow and overflow errors
- **U - =** Send underflow errors
- **O - =** Send overflow errors
- **B - =** Send underflow and overflow errors
- **UU =** Send and receive underflow errors
- **OO =** Send and receive overflow errors
- **BB =** Send and receive underflow and overflow errors

FAX ERR - Number of failed fax connection attempts (cleared after displayed), where:Δ
- **- - - =** No errors
- **001 - 255 =** Number of errors

FAX SPEED - FAX speedΔ

Can be any of the following:
- 14400 (V.17)
- 12000 (V.17)
- 9600 (V.17)
- 7200 (V.17)
- 4800 (V.29)
- 2400 (V.27)
- 9600 (V.32 STU)
- 4800 (V.32 STU)
- 2400 (V.26 STU)
- 300 (B103 STU)
- **- - - =** No fax transmission/reception is in progress

BUSY = V-channel has been blocked using the /B qualifier of the RST CH command.

UNAVAIL = Not connected. Voice Server Module has declared V-channel as failed.

MODEM N/A = No fax/modem capability is available for this channel.

??????????? = Unknown fax speed

VSM 1:09 - Nest:slot of Voice Server Module

MODULE NOT ONLINE - Voice Server Module is not online because:
- **PRIORITY NOT AVAILABLE =** Indicates Voice Server Module is not online because bus priority is unavailable.
- **LOGICAL ID NOT AVAILABLE =** Indicates that Voice Server Module is not online because logical ID is not available.

RANGE SUMMARY - Range summary where:
- **CONNECTED =** Number of connected channels
- **IDLE =** Number of idle channels

Δ = Fax speed is displayed only when VSM.1 or VSM.3 Voice Server Module is used and fax transmission/reception is in progress. For VSM.3 Voice Server Module, fax speed is displayed only when command is issued to module receiving fax. For VSM.5 Voice Server Module, speed is displayed only when operating in STU III secure mode.

Figure 5-64. Typical Voice Server Module Channel Status Display (DSP ST VCH) (Sheet 2)

DISPLAY X.50 SUBRATE CHANNEL STATUS (DSP ST XCH) COMMAND

The DSP ST XCH command displays the operating status of the X.50 subrate channels, Figure 5-65, for the specified X.50 DS-0 channel(s) of an X.50 Server Module.

Command:

[NOD xxxx] DSP ST XCH **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**[/M]

where: cc = X.50 DS-0 channel (1-16)
/M = displays the time slot map

```
N0010>DSP ST XCH 1:6:8/M
XS0 1:06:08
XCH 1:06:08  1   2   3   4   5   6   7   8   9   10
CON ST       CON CON OOS CON CON CON IDL CON --  IDL
LP TIM       --  PRM --  --  --  --  --  --  --  --
PHASOR       --  --  --  -U  BB  O-  --  --  --  --

XCH 1:06:08  11  12  13  14  15  16  17  18  19  20
CON ST       PND IDL --  --  --  --  --  --  --  --
LP TIM       --  --  --  --  --  --  --  --  --  --
PHASOR       --  --  --  --  --  --  --  --  --  --
                     CONNECTED XCH TIMESLOT MAP:
PHASE:  A  A  A  A   B  B  B  B   C  C  C  C   D  D  D  D   E  E  E  E
TSLOT: 01 06 11 16  02 07 12 17  03 06 13 18  04 09 14 19  05 10 15 20
XCHAN: 01 01 01 01  02 -- 02 --  -- 05 -- 05  11 11 11 11  16 -- -- --
```

XS0 1:06:08 (message) - Nest:slot:X.50 DS-0 channel number followed by status message, where:
- **(blank) =** Connected and not in loopback
- **AGGREGATE DISC =** X.50 DS-0 channel is disconnected.
- **AGGREGATE IN LOOPBACK =** X.50 DS-0 channel is in loopback.

XCH 1:06:08 - X.50 subrate channels 1 to 20 for X.50 DS-0 channel specified

CON ST - X.50 subrate channel connection status, where:
- **- - =** Not yet initialized
- **CON =** Connected
- **IDL =** Idle
- **OOS =** Out-of-service

LP TIM - Loopback timeout, where:
- **- - =** No loopback
- **1-240 =** 1 to 240 minute timeout
- **PRM =** Permanent loopback

PHASOR - Phasor status, where:
- **- - =** No errors
- **- U =** Receive underflow errors
- **- O =** Receive overflow errors
- **- B =** Receive underflow and overflow errors
- **U - =** Send underflow errors
- **O - =** Send overflow errors
- **B - =** Send underflow and overflow errors
- **UU =** Send and receive underflow errors
- **OO =** Send and receive overflow errors
- **BB =** Send and receive underflow and overflow errors

PHASE - X.50 time slot grouping (A-E)

TSLOT - Time slots in X.50 frame

XCHAN - X.50 subrate channels

Figure 5-65. Typical X.50 Subrate Channel Status Display (DSP ST XCH)

DISPLAY X.50 DS-0 CHANNEL STATUS (DSP ST XS0) COMMAND

The DSP ST XS0 command displays the aggregate status of the X.50 DS-0 channels, Figure 5-66, for the specified X.50 Server Module(s). The module operating status is also displayed.

Command:

[NOD xxxx] DSP ST XS0 **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**[/C]

where: /C = clears count of framing errors and losses

```
N0010>DSP ST XS0 1:9-1:10
XSM 1:09 - ONLINE SINCE 16:17:18  DATE: MON SEP-27-1993
XS0 1:09  1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16
CON  ST   CON PND CON IDL OOS CON IDL CON IDL IDL OOS IDL IDL IDL IDL IDL
LP  TIM   --  PRM --  --  --  --  --  --  --  --  --  --  --  --  --  --
PHASOR    --  --  --  --  -B  O-  --  U-  --  --  BB  --  --  --  --  --
FRM ERR   000 000 001 --  OVR 126 --  000 --  --  OVR --  --  --  --  --
FRM LOSS  000 000 001 --  OVR 051 --  000 --  --  OVR --  --  --  --  --
QUALITY   VG  PND VG  --  LOS GD  --  FR  --  --  ROS --  --  --  --  --

XSM 1:10   STANDBY SINCE 16:17:30  DATE: MON SEP-27-1993
```

XSM 1:09 - ONLINE SINCE - Nest:slot location of X.50 Server Module and module status (ONLINE, OFFLINE, STANDBY, FAILED, or INITIALIZING)
16:17:18 - Time module came online
DATE - Date module came online
XS0 1:09 - X.50 DS-0 channel numbers 1 to 16
CON ST - Channel connection status, where:
- **- - =** Not yet initialized
- **CON =** Connected
- **IDL =** Idle
- **OOS =** Out-of-service
- **PND =** Pending (connection in progress)

LP TIM - Loopback timeout, where:
- **- - =** No loopback
- **1-240 =** 1 to 240 minute timeout
- **PRM =** Permanent loopback

PHASOR - Phasor status, where:
- **- - =** No errors
- **- U =** Receive underflow errors
- **- O =** Receive overflow errors
- **- B =** Receive underflow and overflow errors
- **U - =** Send underflow errors
- **O - =** Send overflow errors
- **B - =** Send underflow and overflow errors
- **UU =** Send and receive underflow errors
- **OO =** Send and receive overflow errors
- **BB =** Send and receive underflow and overflow errors

FRM ERR - Frame errors, where:
- **- - =** Not connected (idle)
- **000 - 999 =** Number of frame errors
- **OVR =** Overflow (errors exceed 999)

FRM LOSS - Frame losses, where:
- **- - =** Not connected (idle)
- **000 - 999 =** Number of frame losses
- **OVR =** Overflow (losses exceed 999)

QUALITY - Quality performance, where:
- **VG =** Very good
- **GD =** Good
- **FR =** Fair
- **PR =** Poor
- **PND =** Pending
- **N/A =** Not applicable
- **LOS =** Local out-of-sync
- **ROS =** Remote out-of-sync
- **- - =** Disconnected

Figure 5-66. Typical X.50 DS-0 Channel Status Display (DSP ST XS0)

DISPLAY SYSTEM PARAMETERS (DSP SY) COMMAND

The DSP SY command displays the current system parameter values, Figure 5-67.

Command:

[NOD xxxx] DSP SY

```
N0006>DSP SY
NODE:0006     MASTER CLOCKING NODE, PRIORITY = 03
ROUTING TABLES: NON-REGIONALIZED
NODAL SECURITY: ENABLED
LEVEL 1 USERS CON/DSC : DISABLED
SP TIMEOUT:  ENABLED
UNSOLICITED MESSAGES: LOCAL= DISABLED    REMOTE= ENABLED
RET TIMER:02          DIAL TIMER:004     DIAL RETRY:02
OOS TIMER:12
MX PHASOR:08
SYSTEM CLOCK FALLBACK= DLR 09,DLT 07,SKP
ALARM LIST:0010,0025
MASTER CLK LIST:0025,0003,0005,0010,0160,0035,0074,0082,
                0066,0124,0149
BUMPING SCHEME : POINT TO POINT
ILP CONTENTION : ENABLED
SYSTEM GROOMING: ENABLED
                   SUN   MON   TUE   WED   THU  *FRI   SAT
GROOM DISC TIME : 23:00 23:00  ***   ***   ***  23:00 23:00
GROOM RECON TIME: 23:10 23:10  ***   ***   ***  23:16 23:10
ST CLK-1 2048000
ST CLK-2 2048000
I/O ERR CHR:00
TIME OFFSET: 02:00    ALARM FORWARDING: TAQ
```

NODE - Node number

MASTER CLOCKING NODE, PRIORITY - Network clocking type and priority level (blank if node is not a master clocking node)

ROUTING TABLES - Routing tables (REGIONALIZED or NON-REGIONALIZED)

NODAL SECURITY - Nodal security (ENABLED or DISABLED)

LEVEL 1 USERS CON/DSC - Password level 1 user's ability to use CON and DSC commands (ENABLED or DISABLED) (only displayed when passwords are defined)

SP TIMEOUT - Supervisory port timeout (ENABLED or DISABLED) (only displayed when passwords are defined)

UNSOLICITED MESSAGES - Unsolicited messages (ENABLED or DISABLED)

RET TIMER - System connect retry time (displayed value x 15 = seconds)

DIAL TIMER - Dial-up services retry timeout value in 30-second intervals

DIAL RETRY: **-** Retry attempts for dial-up services

OOS TIMER - Intermachine link out-of-service time

MX PHASOR - System maximum phasor size (bytes)

SYSTEM CLOCK FALLBACK - System clock fallback list

ALARM LIST - Alarm notification list (for remote command, blank if nodal security is enabled at receiving node and originating node is not on alarm notification list of receiving node)

MASTER CLK LIST - Master clock list

BUMPING SCHEME - Bumping scheme (POINT TO POINT, END TO END, or DISABLED)

Figure 5-67. Typical System Parameter Display (DSP SY) (Sheet 1 of 2)

ILP CONTENTION - ILP contention (ENABLED or DISABLED)
SYSTEM GROOMING - System grooming (ENABLED or DISABLED)
GROOM DISC TIME - Grooming disconnect times (*** = Time not indicated)
GROOM RECON TIME - Grooming reconnect times (*** = Time not indicated)
When the day of week is preceded by *, the groom reconnect time exceeds the groom disconnect time by more than 15 minutes.

ST CLK-1 - Speed of station clock 1
ST CLK-2 - Speed of station clock 2
I/O ERR CHR - I/O error character
TIME OFFSET - Time-stamped alarm ± offset in hours:minutes
ALARM FORWARDING - Alarm forwarding, where:
AQ = Sends "I have an Alarm" message if any alarms are in DSP AQ queue.
TAQ = Sends "I have an Alarm" message if any alarms are in DSP TAQ queue.

Figure 5-67. Typical System Parameter Display (DSP SY) (Sheet 2)

DISPLAY AND CLEAR TIME-STAMPED ALARM LIST (DSP TAQ, CLR TAQ) COMMANDS

The DSP TAQ command displays alarms that are currently in the TAQ alarm list as well as their associated time-stamp. Alarms are displayed in FIFO order. Once the alarm list is filled, each successive new entry will force the oldest entry from the list until the list is cleared.

The CLR TAQ command clears the time-stamped alarm list. See Appendix A, Error and Status Messages, for a description of each alarm.

Commands:

[NOD xxxx] DSP TAQ **[**a[-a]...[,a[-a]]**]**

where: a = alarm number

or:

[NOD xxxx] DSP TAQ [/C]

where: /C = clears the alarm list after the time-stamped alarms are displayed.

[NOD xxxx] CLR TAQ

Two types of alarms are reported by the LINK/2+ System, state alarms and event alarms:

- **State alarms**, once they occur, are logged and a **start** of state alarm is generated. State alarms are then continually monitored by the system until the alarm condition returns to a non-alarm state, at which time an **end** of state alarm is generated.
- **Event alarms** are logged each time they occur.

Typical DSP TAQ commands are illustrated in Figure 5-68.

NOTE: *Alarm 12 will only be posted on the initial failure of a channel to connnect. While the channel remains in the retry queue and continues to attempt a connection, additional alarm 12's will not be generated. If a connect channel command is subsequently issued to that channel before it connects, however, alarm 12 will be posted again.*

To further display the error conditions flagged by the alarm list, use the DSP ST CH, DSP ST DS0, DSP ST DS1, DSP ST DL, DSP ERR, DSP ST LFM, DSP ST SY, DSP ST ALM 1, DSP ST ALM 2, DSP ST ALM 6, DSP ST ALM 7, DSP ST ALM 9, DSP ST ALM 10, DSP ST ALM 12, DSP ST ALM 15, DSP ST ALM 21, DSP ST ALM 24, DSP ST ALM 25, DSP ST ALM 26, DSP ST ALM 27, DSP ST ALM 33, and DSP HIS commands.

```
N0001>dsp taq
STATUS: LAST ALARM LOGGED ON JUL-13-1995 AT 18:10:04
THE LAST 16 SELECTED ALARM OCCURRENCES:
ALM:  SOURCE:     DATE:        TIME:     ALARM TYPE:
  9   1:03        JUL-13-1995  18:08:59  S  DATABASE CONFLICT
  9   1:10        JUL-13-1995  18:09:00  S  DATABASE CONFLICT
  9   1:11        JUL-13-1995  18:09:00  S  DATABASE CONFLICT
 15   2:12        JUL-13-1995  18:09:04  S  ILP ALARM
 21   1:07        JUL-13-1995  18:09:06  S  RED/YELLOW ALARM ON CSP/ILQ
 34               JUL-13-1995  18:09:14     LAST STANDBY XSM USED
 21   1:07        JUL-13-1995  18:09:16  E  RED/YELLOW ALARM ON CSP/ILQ
  6   1:07:07     JUL-13-1995  18:09:21     LINK IN-SERVICE
  6   1:06        JUL-13-1995  18:09:31     LINK IN-SERVICE
 12   1:07:24     JUL-13-1995  18:09:44     CONNECTION FAILURE
 12   1:13:01:01  JUL-13-1995  18:09:44     CONNECTION FAILURE
 12   1:11:01     JUL-13-1995  18:09:44     CONNECTION FAILURE
 12   1:09:01     JUL-13-1995  18:09:44     CONNECTION FAILURE
 24   1:07        JUL-13-1995  18:10:04     LINK BER BELOW THRESHOLD
```

A. DISPLAY ALL ALARMS

```
N0001>dsp taq 15,21,34
STATUS: LAST ALARM WRAPPED ON JUL-13-1995 AT 18:10:04
THE LAST 3 SELECTED ALARM OCCURRENCES:
ALM:  SOURCE:     DATE:        TIME:     ALARM TYPE:
 15   2:12        JUL-13-1995  18:09:04  S  ILP ALARM
 21   1:07        JUL-13-1995  18:09:06  S  RED/YELLOW ALARM ON CSP/ILQ
 21   1:07        JUL-13-1995  18:09:16  E  RED/YELLOW ALARM ON CSP/ILQ
 34               JUL-13-1995  18:09:14     LAST STANDBY XSM USED
```

B. DISPLAY A RANGE OF ALARMS

STATUS: - Lists the time that last alarm occurred, where:
- **LOGGED** = TAQ buffer has not overflowed
- **WRAPPED** = TAQ buffer overflowed

ALM: - Alarm number

SOURCE: - Source of alarm, where:
- **1:03** = nest:slot
- **1:03:04** = nest slot:channel
- **1:03:04:08** = nest:slot:channel:subrate channel
- **blank** = Not a nest:slot specific alarm

DATE - Date in month-day-year

TIME - Time of day in 24-hour format; hours:minutes:seconds

ALARM TYPE: - Alarm description, where:
- **S** = Start of state alarm
- **E** = End of state alarm
- **blank** = Event alarm

Figure 5-68. Typical Time-Stamped Alarm List Display (DSP TAQ)

DISPLAY TIME OF DAY (DSP TIM) COMMAND

The DSP TIM command displays time of day (24-hour format) in hours:minutes:seconds, day of week, and day of the year as month-day-year, Figure 5-69.

Command:

[NOD xxxx] DSP TIM

If the real time clock fails, the message "ERROR RTC" is displayed.

```
N0010>DSP TIM
TIME: 16:25:53  DATE: THU JUN-09-1994
```

TIME - Time of day in 24-hour format; hour:minutes:seconds

DATE - Day of week and month-day-year

Figure 5-69. Typical Time and Date Display (DSP TIM)

DISPLAY TOPOLOGY (DSP TOP) COMMAND

The DSP TOP command displays all intermachine link connections between the local node and any remote nodes. The command displays the slot numbers of the Interlink Modules and the slot and bundle numbers of the Integrated Trunk Modules at the local node and indicates the remote node, slots, and bundle numbers to which each intermachine link is connected, Figure 5-70. If the connection is via a logical node, the logical node number is displayed.

NOTE: *The translation type is displayed with the logical node number when full translation is defined.*

For simplex intermachine link connections, the DSP TOP command shows logical node translation status at the transmitting node only, not at the receiving node.

Command:

[NOD xxxx] DSP TOP

```
N0001>DSP TOP
 LINK 1:09     ->NODE:0010 L03
 LINK 1:10:12  ->NODE:0013 L05
*LINK 1:11
 LINK 1:12:11  ->NODE:0002 L12:16
 LINK 1:15     ->NODE:0100 L05
 LINK 1:16'
 LINK 1:17     ->NODE:0102 N/A
```

LINK 1:09 - Nest:slot number of Interlink Module at local node

LINK 1:10:12 - Nest:slot:bundle number of Integrated Trunk Module at local node

***LINK 1:11 -** Asterisk indicates link is out-of-service.

LINK 1:16' - Apostrophe indicates offline module of a redundant pair.

->NODE:0010 - Remote node number to which intermachine link is connected

L03 - Slot number of Interlink Module at remote node. Slot numbers above 32 indicate slot in LINK/100+ Dual Mainframe 2. To determine actual slot, subtract 32.

L12:16 - Slot:bundle number of Integrated Trunk Module at remote node

N/A - N/A indicates remote node is a LINK/1 System.

Figure 5-70. Typical Topology Display (DSP TOP)

DISPLAY TIME SLOT ASSIGNMENTS (DSP TS) COMMAND

The DSP TS command displays the allocated time slots in a full T-1 frame for the specified LFM.10, LFM.11, or LFM.12 Link Framing Module(s), Figure 5-71.

Command:

[NOD xxxx] DSP TS **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0010>DSP TS 1:11
LFM  1:11
TS:  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
 A:  A  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 B:  -  -  -  -  -  B  -  B  -  B  B  -  -  B  -  -  -  B  B  B  B  -  -  B
```

LFM 1:11 - Nest:slot location of specified Link Framing Module

TS - Time slots

A - Assigned time slots for connection A of the Link Framing Module

– (dash) - Unassigned time slots

B - Assigned time slots for connection B of the Link Framing Module

NOTE: Time slot B applies to LFM.12 Module in 2-to-2 mode only.

Figure 5-71. Typical Time Slot Assignments Display (DSP TS)

DISPLAY PARTIAL TEST (DSP TST) COMMAND

The DSP TST command displays the results of the message generator counters for partial P1 or P2 tests. See Chapter 7, Diagnostic Commands, for information on initiating the tests with the TST command.

Command:

[NOD xxxx] DSP TST

Figure 5-72 illustrates a typical DSP TST command display.

When initiated by a local command, the test results display is updated continuously. Pressing any key at the supervisory terminal stops the display.

When initiated by a remote command, the test results are only displayed once.

```
N0010>DSP TST
G*35107 B 136
```

G - Good bytes
*** -** Buffer overflow, where asterisk (*) following:
G = Good byte counter has overflowed.
B = Bad byte counter has overflowed.

35107 - Number of good bytes received
B - Bad bytes
136 - Number of bad bytes received

Figure 5-72. Typical Partial Test Display (DSP TST)

DISPLAY VOICE PROFILE (DSP VPR) COMMAND

The DSP VPR command displays the defined voice profile for the specified voice profile number, Figure 5-73.

Command:

[NOD xxxx] DSP VPR **{*** *or* vp[-vp]...**[**,vp[-vp]**]}**

where: vp = voice profile number (1-64)

```
N0010>DSP VPR 1-3
         SPEED       ECH CANL   ECH TAIL   CEN CLIP   TONE DSB
VPROF 01 16K-ATC     ENABLED    32 MS      DISABLED   OFF
VPROF 02 8K-ASET     ENABLED    16 MS      DISABLED   ON
VPROF 03 4.8K STU    ENABLED     8 MS      DISABLED   OFF

         CON TYP     LOCAL IO   FAX        FAX DELAY   NSF
VPROF 01 GRND START  FXO        YES        NORMAL      DISABLE
VPROF 02 4-WIRE                 NO
VPROF 03 GRND START  FXO        NO

         SF SIG      REC GAIN   XMIT GAIN  TONE MIN    TONE MAX
VPROF 01 2280        0 DB       0 DB       OFF         OFF
VPROF 02 2280
VPROF 03 2280        0 DB       0 DB       OFF         OFF
```

VPROF 01 - Voice profile number
SPEED - Compression speed
ECH CANL - Echo canceler
ECH TAIL - Echo tail length
CEN CLIP - Center clipper
TONE DSB - Tone detection
CON TYP - Connection type
LOCAL IO - Local IO
FAX - Fax required
DELAY - Fax delay
NSF - Nonstandard fax features
SF SIG - Single frequency signaling (Hz)
REC GAIN - Receive gain
XMIT GAIN - Transmit gain
TONE MIN - Not currently supported
TONE MAX - Not currently supported

Figure 5-73. Typical Voice Profile Display (DSP VPR)

DISPLAY X.50 SUBRATE CHANNEL PARAMETERS (DSP XCH) COMMAND

The DSP XCH command displays the current parameter values, Figure 5-74, for the specified X.50 subrate channel(s) of an X.50 Server Module.

Command:

[NOD xxxx] DSP XCH **{*** *or* n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}**

where: cc = X.50 DS-0 channel (1-16)
sr = X.50 subrate channel (1-20)

```
N0010>DSP XCH 1:3:6:1
           CONNECT     PROFILE     PRIORITY    DELAYTHR    SPEED       MAPPING
1:03:06:01 ORIG        DEFAULT     01          00          9600        C

           FNS         PHASOR
1:03:06:01 INBAND      4
```

1:03:06:01 - Nest:slot:X.50 DS-0 channel:X.50 subrate channel number
CONNECT - Originator/terminator
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
SPEED - X.50 subrate channel speed (bps)
MAPPING - Time slot position within X.50 frame
FNS - Mode of transmitting EIA functions
PHASOR - Phasor size (bytes)

Figure 5-74. Typical X.50 Subrate Channel Parameter Display (DSP XCH)

DISPLAY X.50 DS-0 CHANNEL PARAMETERS (DSP XS0) COMMAND

The DSP XS0 command displays the current parameter values, Figure 5-75, for the specified X.50 DS-0 channel(s) of an X.50 Server Module.

Command:

[NOD xxxx] DSP XS0 **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

where: cc = X.50 DS-0 channel (1-16)

```
N0010>DSP XS0 1:5:1
         CONNECT     PROFILE     PRIORITY    DELAYTHR    PROTOCOL    IDLE
1:05:01  ORIG        DEFAULT     16          07          DIV-2       42

         FNS         OOS         PHASOR
1:05:01  INBAND      17          MX
```

1:05:01 - Nest:slot:X.50 DS-0 channel number
CONNECT - Originator/terminator
PROFILE - ABM profile (when preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
PROTOCOL - X.50 frame format
IDLE - Number of idle channels
FNS - Mode of transmitting EIA functions
OOS - Out-of-service timer
PHASOR - Phasor size (bytes)

Figure 5-75. Typical X.50 DS-0 Channel Parameter Display (DSP XS0)

Chapter 6

Configuration Commands

LINK/2+ Systems are preprogrammed according to the configuration worksheets submitted with the order. Initial configuration of a LINK/2+ System requires a configuration planning process, which is discussed in the LINK/2+ Configuration Planning Manual.

Subsequent changes in the network may require configuration changes or complete reconfiguration of one or more nodes. This chapter discusses the commands used to perform typical configuration activities, provides guidelines for performing configuration activities, and describes all supervisory port configuration (programming) commands. Configuration commands are used to:

- Define system, intermachine link, DS-1/E-1, ISDN D-channel, quality, DS-0, Link Framing Module, and I/O channel parameters
- Define routing
- Define bundle configurations
- Define channel connections and broadcast/polling connections
- Define ABM, speed, and voice profiles
- Connect and disconnect channels

The supervisory port configuration commands are listed in Table 6-1. Commands are in alphabetical order by command mnemonic. Parameters that can be programmed using the supervisory terminal are described in the Configuration Planning Manual.

TYPICAL CONFIGURATION ACTIVITIES

The examples in this chapter guide the user in:

- Verifying parameters
- Changing parameters
- Adding modules
- Adding a node to the network or reconfiguring a node

Before beginning any configuration task:

❒ Obtain a copy of each affected configuration worksheet for the node(s) to be programmed.

❒ If programming active LINK/2+ System(s), determine what effect the programming operations will have on data flow, and notify users as necessary.

Table 6-1. Configuration Commands

G	N	Command
G	#	CLR FMC **Description:** Clears node from being a master clocking node. Node then defaults to a slave clocking node.
G	#	NOD xxxx CLR GWY {CP *or* SP} **Description:** Clears supervisory computer port (CP) or supervisory port (SP) of gateway status. Command must be directed to a remote node.
G	#	CLR MC **Description:** Clears node from being a master clocking node. Node then defaults to a slave clocking node.
G	#	CLR MM **Description:** Clears node from being a master clocking node. Node then defaults to a slave clocking node.
G	#	CLR POL {* *or* n:ss:c[-n:ss:c]... [,n:ss:c[-n:ss:c]]}[/A] **Description:** Disconnects and clears the specified channel from the associated broadcast/polling group. Optional /A modifier clears the master broadcast/polling channel and all broadcast/polling group members associated with the specified master channel.
G	#	CLR PRO {* *or* ppp[-ppp]...[,ppp[-ppp]]} **Description:** Deletes specified ABM profile(s).
G	#	CLR RDN [n:]ss **Description:** Clears redundancy on Interlink Module, Integrated Trunk Module, Channelized Services Processor, and Voice Processor pairs; and resets both modules of the redundant pair.
G	#	CLR REG **Description:** Defines the node as nonregionalized routing.
G	#	CLR RTE xxxx[-xxxx]... [,xxxx[-xxxx]] **Description:** Clears routing table for specified node(s).
G	#	CLR SEC **Description:** Disables nodal security; allows the node to accept global gateway commands from any gateway node.
G	#	CLR SPR sp **Description:** Clears the Isochronous Communication Module speed(s) defined for the specified profile number, where: sp = speed profile number (1-16)
G	#	CLR VPR vp **Description:** Clears the defined voice profile for the specified voice profile number, where: vp = voice profile number (1-64)
G	#	CNV BIAS ss_1[:cc_1] {ss_2[:cc_2] *or* OFF} **Description:** Changes bias routing from one intermachine link or bundle (ss_1[:cc_1]) to another (ss_2[:cc_2]), or to off. Bundle number is used for Integrated Trunk Module proprietary connections.
G	#	CNV PRO ppp_1 ppp_2 **Description:** Converts the ABM profile of all channels using profile ppp_1 to ppp_2.

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	CON * **Description:** Loads parameters and connects all I/O channels, DS-0 channels, X.50 DS-0 channels, and X.50 subrate channels.
G	#	CON {n:ss:cc:sr[-n:ss:cc:sr]... [,n:ss:cc:sr[-n:ss:cc:sr]]} **Description:** Loads parameters and connects specified X.50 subrate channels.
G	#	CON BDL {* *or* n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]} [/B_z or /X_z] **Description:** Loads parameters and connects bundled DS-0 channels when master DS-0 channel is specified.
G	#	CON CH {* *or* n:ss:c[-n:ss:c]... [,n:ss:c[-n:ss:c]]} **Description:** Loads parameters and connects specified I/O channel(s).
G	#	CON DR {* *or* n:ss:c[-n:ss:c].. .[,n:ss:c[-n:ss:c]] p_1[,p_2,...p_8]} CON DR {* *or* n:ss:cc[-n:ss:cc].. .[,n:ss:cc[-n:ss:cc]] p_1[,p_2,...p_8] [/B *or* /X]} CON DR {* *or* n:ss:cc:sr[-n:ss:cc:sr].. .[,n:ss:cc:sr[-n:ss:cc:sr]] p_1[,p_2,...p_8]} **Description:** Loads parameters and connects specified channel to its destination using specified route, where: /B = overrides the first path number and specifies the corresponding backup bundle instead. /X = overrides the first path number and specifies the corresponding expansion bundle instead.
G	#	CON DS0 {* *or* n:ss:cc[-n:ss:cc]…[,n:ss:cc[-n:ss:cc]]} [/B_z or /X_z] **Description:** Loads parameters and connects specified DS-0 channel(s) and bundled DS-0 channels when master DS-0 channel is specified, where: /B_z = specifies the use of the backup dial link directory associated with z, the Interlink Module slot or Integrated Trunk Module bundle number. /X_z = specifies the use of the expansion dial link directory associated with z, the Interlink Module slot or Integrated Trunk Module bundle number.
G	#	CON ND {* *or* xxxx[-xxxx]…[,xxxx[-xxxx]]}[/Ppr] **Description:** Loads parameters and connects all channels originating at this node and terminating at specified node(s). Optional /Ppr modifier restricts connect request to channels with specified priority level.
G	#	CON POL {* *or* n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]]}[/A] **Description:** Connects the specified channel to the defined broadcast/polling group. Optional /A modifier connects all broadcast/polling group members associated with the specified master channel.
G	#	CON PR {* *or* pr[-pr]…[,pr[-pr]]}[/Nxxxx] **Description:** Loads parameters and connects all channels originating at this node that have the specified priority level(s). Optional /Nxxxx modifier restricts connect request to specified termination node.
G	#	CON PRO ppp[-ppp]…[,ppp[-ppp]][/D] CON PRO /D **Description:** Connects all channels that have been assigned to the specified ABM profile(s). Optional /D qualifier includes default ABM profile in the range.
G	#	DEF ALM **Description:** Defines alarm notification list. In response to prompts, enter up to 16 node numbers.
G	#	DEF BDL NPR {* *or* 1:ss:cc[-1:ss:cc]…[,1:ss:cc[-1:ss:cc]]} **Description:** Defines parameters for nonproprietary bundles on the specified Integrated Trunk Module.

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	DEF BDL PR {* *or* 1:ss:cc[-1:ss:cc] . . . [,1:ss:cc[-1:ss:cc]]} **Description:** Defines parameters for proprietary bundles on the specified Integrated Trunk Module.
G	#	DEF BIAS CH n:ss:c[-n:ss:c] . . . [,n:ss:c[-n:ss:c]]/*routing* **Description:** Defines bias routing at originator end of I/O channel(s). *Routing* is one of the following: Lss[:cc] = bias intermachine link or bundle Lss[:cc}/O = odd-numbered I/O channels routed through the bias intermachine link or bundle Lss[:cc]/E = even-numbered I/O channels routed through the bias intermachine link or bundle OFF = terminate bias routing OFF/O = terminate bias routing only for odd-numbered I/O channels OFF/E = terminate bias routing only for even-numbered I/O channels
G	#	DEF BIAS DS0 n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]/*routing* **Description:** Defines bias routing at originator end of DS-0 channel(s) or bundled DS-0 channels.*Routing* is one of the following: Lss[:cc] = bias intermachine link or bundle Lss[:cc]/O = odd-numbered DS-0 channels routed through the bias intermachine link or bundle Lss[:cc]/E = even-numbered DS-0 channels routed through the bias intermachine link or bundle OFF = terminate bias routing OFF/O = terminate bias routing only for odd-numbered DS-0 channels OFF/E = terminate bias routing only for even-numbered DS-0 channels
G	#	DEF CFB 1 *clock* DEF CFB 2 *clock* DEF CFB 3 *clock* **Description:** Defines system clock fallback list—primary clock source (CFB 1) and two fallback sources (CFB 2 and CFB 3). *Clock* is one of the following: CH 1:ss:c = synchronous channel receive clock DLR ss = intermachine link receive clock DLT ss = intermachine link transmit clock DRI ss = intermachine link independent receive clock DS1 n:ss = DS-1 trunk clock DS1 n:ss/SC1 = DS-1 trunk clock with Voice Processor output to Network Module station clock 1 DS1 n:ss/SC2 = DS-1 trunk clock with Voice Processor output to Network Module station clock 2 INT = internal 6 MHz oscillator LFM n:ss = NTT High-Speed Secondary Service trunk clock (from LFM.14 Module) LFM n:ss/SC1 = NTT High-Speed Secondary Service trunk clock with LFM.14 Module output to Network Module station clock 1 LFM n:ss/SC2 = NTT High-Speed Secondary Service trunk clock with LFM.14 Module output to Network Module station clock 2 SC1 = Network Module station clock 1 input SC2 = Network Module station clock 2 input SKP = skip clock source

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	DEF CH*/module* n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]] **Description:** Defines channel parameters for specified type of I/O module. *Module* is one of the following: DCI = Dual Isochronous Module DSC = Dual Synchronous Module EVM = Enhanced Voice Module FXO = Foreign Exchange Office Module FXS = Foreign Exchange Station Module ICM = Isochronous Communication Module QAM = Quad Asynchronous Module QSC = Quad Synchronous Module, QVC Voice Module, or Subrate Channel Processor QSP = Quad Synchronous Processor QVM = QVM Voice Module QVM.1 = QVM.1 Voice Module QVM.2 = QVM.2 Voice Module QVM.3 = QVM.3 Voice Module QVM.5 = QVM.5 Voice Module QVM.6 = QVM.6 Voice Module
G	#	DEF CON n_L:ss_L:c_L[-n_L:ss_L:c_L]/Nxxxx {Cn_D:ss_D:c_D[-n_D:ss_D:c_D] *or* Dn_D:ss_D:cc_D[-n_D:ss_D:cc_D] *or* Xn_D:ss_D:cc_D:sr_D[-n_D:ss_D:cc_D:sr_D]} **Description:** Defines channel connection from an I/O channel to another I/O channel or to a DS-0 channel or X.50 subrate channel, where /Nxxxx specifies node number of destination channel. Destination channel must be at a remote node for I/O channel to I/O channel connections.
G	#	DEF CP **Description:** Defines supervisory computer port parameters.
G	#	DEF CSP 1:ss[-1:ss]…[,1:ss[-1:ss]] **Description:** Defines DS-1 parameters for Channelized Services Processor(s) in specified slot(s).
G	#	DEF DCM {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Defines ISDN D-channel parameters for the specified D-Channel Module(s).
G	#	DEF DL ss[-ss]…[,ss[-ss]] **Description:** Defines intermachine link parameters for Interlink Module(s) in specified slot(s).
G	#	DEF DST CH n_L:ss_L:c_L[-n_L:ss_L:c_L]/Nxxxx {Cn_D:ss_D:c_D[-n_D:ss_D:c_D] *or* Dn_D:ss_D:cc_D[-n_D:ss_D:cc_D] *or* Xn_D:ss_D:cc_D:sr_D[-n:ss_D:cc_D:sr_D]} **Description:** Defines channel connection from an I/O channel to another I/O channel, a DS-0 channel, or X.50 subrate channel, where /Nxxxx specifies node number of destination channel. Destination channel must be at a remote node for I/O channel to I/O channel connections.
G	#	DEF DST DS0 n_L:ss_L:cc_L[-n_L:ss_L:cc_L]/Nxxxx {Dn_D:ss_D:cc_D[-n_D:ss_D:cc_D] *or* Cn_D:ss_D:c_D[-n_D:ss_D:c_D] *or* Xn_D:ss_D:cc_D[-n_D:ss_D:cc_D]} **Description:** Defines channel connection from a DS-0 channel to another DS-0 channel, an I/O channel, or X.50 DS-0 channel, where /Nxxxx specifies node number of destination channel.
G	#	DEF DST XCH n_L:ss_L:cc_L:sr_L[-n_L:ss_L:cc_L:sr_L]/Nxxxx {Xn_D:ss_D:cc_D:sr_D[-n_D:ss_D:cc_D:sr_D] *or* Cn_D:ss_D:c_D[-n_D:ss_D:c_D]} **Description:** Defines channel connection from an X.50 subrate channel to another X.50 subrate channel or to another I/O channel, where Nxxxx specifies node number of destination channel.

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	DEF DST XS0 n_L:ss_L:cc_L[-n_L:ss_L:cc_L]/Nxxxx {Xn$_D$:ss$_D$:cc$_D$[-n$_D$:ss$_D$:cc$_D$] *or* Dn$_D$:ss$_D$:cc$_D$[-n$_D$:ss$_D$:cc$_D$] *or* Cn$_D$:ss$_D$:c$_D$[-n$_D$:ss$_D$:c$_D$]} **Description:** Defines channel connection from an X.50 DS-0 channel to another X.50 DS-0 channel, a DS-0 channel, or an I/O channel, where /Nxxxx specifies node number of destination channel.
G	#	DEF DS0 n:ss:cc[-n:ss:cc]…[,n:ss:cc[-n:ss:cc]] **Description:** Defines DS-0 channel parameters for specified Voice Processor DS-0 channel(s).
G	#	DEF DS1 n:ss[-n:ss]…[,n:ss[-n:ss]] **Description:** Defines DS-1 parameters for Voice Processor(s) in specified slot(s).
G	#	DEF EP **Description:** Defines external port parameters.
G	#	DEF ILQ 1:ss[-1:ss]…[,1:ss[-1:ss]] **Description:** Defines DS-1 parameters for the specified Integrated Trunk Module(s).
G	#	DEF LFM 3 n:ss[-n:ss]…[,n:ss[-n:ss]] **Description:** Defines parameters for specified Link Framing Module(s) (Model LFM.3).
G	#	DEF LFM 10 n:ss[-n:ss]…[,n:ss[-n:ss]] **Description:** Defines parameters for specified Link Framing Module(s) (Model LFM.10).
G	#	DEF LFM 11 n:ss[-n:ss]…[,n:ss[-n:ss]] [/1] **Description:** Defines parameters for specified Link Framing Module(s) (Model LFM.11), where /1 specifies two-to-one mode.
G	#	DEF LFM 12 n:ss[-n:ss]…[,n:ss[-n:ss]] [/1 *or* /2] **Description:** Defines parameters for specified Link Framing Module(s) (Model LFM.12), where /1 specifies two-to-one mode and /2 specifies two-to-two mode.
G	#	DEF LFM 14 n:ss[-n:ss]…[,n:ss[-n:ss]] **Description:** Defines parameters for specified Link Framing Module(s) (Model LFM.14).
G	#	DEF MCL **Description:** Defines remote master clocking node(s) that will receive "alive and well" and clock status messages from the local master clocking node. In response to prompts, enter up to 15 node numbers.
G	#	DEF MDS0 1:ss:cc[-1:ss:cc]…[,1:ss:cc[-1:ss:cc]] **Description:** Defines master DS-0 channel parameters for specified Channelized Services Processor DS-0 channel(s).
G	#	DEF MM cpr **Description:** Defines node as a master clocking node for the network and assigns a clock priority to the node.
G	#	DEF MSR POL n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]] **Description:** Defines the broadcast/polling master channel.
G		DEF NOD xxxx **Description:** Enters specified node number of local LINK/2+ System in the database.

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	DEF OOS tt **Description:** Defines time in seconds (2, 4, 6, 8, 10, 12, 14, or 16) before out-of-sync intermachine link is declared out of service.
G	#	DEF POL n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]]/M n:ss:c **Description:** Defines specified channel(s) to a broadcast/polling group with the specified master channel.
G	#	DEF PRO ppp **Description:** Defines parameters for a single ABM profile.
G	#	DEF PSZ pp **Description:** Defines system maximum phasor size (8, 10, 12, or 14) in bytes.
G	#	DEF QUA {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Defines parameter values for performance monitoring of the interface of Voice Processor(s) and Channelized Services Processor(s) specified.
G	#	DEF RET zz **Description:** Defines time Network Module will wait before attempting to reconnect channels after intermachine link failure or after previous attempt to connect failed. Retry timer number zz (00, 02 to 16) = waiting time from 2 seconds (zz = 0) to 240 seconds (zz = 16).
G	#	DEF RTE xxxx [/F] **Description:** Defines routing to specified node. In response to prompts, enter up to eight paths. Each path is specified by intermachine link number, bundle number, and path delay. Optional /F modifier allows routing paths to be defined in any order of path delay.
G	#	DEF SC **Description:** Defines station clock speeds.
G	#	DEF SP **Description:** Defines supervisory port parameters. For parameters to take effect, Network Module DIP switch must be set to use database parameters; otherwise, default supervisory port parameters are used.
G	#	DEF SPR sp **Description:** Defines the Isochronous Communication Module speed(s) for the specified profile number, where: sp = speed profile number (1-16)
G	#	DEF VPR vp **Description:** Defines the voice profile for the specified voice profile number, where: vp = voice profile number (1-64)
G	#	DEF XCH n:ss:cc:sr[-n:ss:cc:sr]...[,n:ss:cc:sr[-n:ss:cc:sr]] **Description:** Defines the X.50 subrate channel parameters for the specified X.50 Server Module.
G	#	DEF XS0 n:ss:cc[-n:ss:cc]...[,n:ss:cc[-n:ss:cc]] **Description:** Defines the X.50 DS-0 channel parameters for the specified X.50 Server Module.

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	DEL {* *or* n:ss[-n:ss]…[,n:ss[-n:ss]]} **Description:** Deletes database entries for specified slot(s).
G	#	DEL CH n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]] *or* n:ss:cc[-n:ss:cc]…[,n:ss:cc[-n:ss:cc]] *or* n:ss:cc:sr[-n:ss:cc:sr]…[,n:ss:cc:sr[-n:ss:cc:sr]] **Description:** Deletes database entries for specified I/O channel(s), DS-0 channel(s), X.50 DS-0 channels, or X.50 subrate channels.
G	#	DEL RTE xxxx p **Description:** Deletes the route with path number p to the specified node from the routing table.
G	#	DSC * [/F *or* /T] **Description:** Disconnects all I/O channels, DS-0 channels, X.50 DS-0 channels, and X.50 subrate channels. Proprietary bundles are excluded. Optional /F modifier disconnects the specified bundle and all channels on the bundle or disconnects the X.50 DS-0 channel and all associated X.50 subrate channels. Optional /T modifier disconnects specified I/O channels, DS-0 channels, X.50 DS-0 channels, or X.50 subrate channels at the terminator end of a connection.
G	#	DSC n:ss:cc:sr[-n:ss:cc:sr]... [,n:ss:cc:sr[-n:ss:cc:sr]][/T] **Description:** Disconnects all specified X.50 subrate channels. Optional /T modifier disconnects specified X.50 subrate channels at the terminator end of a connection.
G	#	DSC BDL {* *or* n:ss:cc[-n:ss:cc]…[,n:ss:cc[-n:ss:cc]]}[/F *or* /T] **Description:** Disconnects bundled DS-0 channels when master DS-0 channel is specified.
G	#	DSC BP {Nxxxx n:ss:cc *or* ccc-ccc} **Description:** Temporarily disconnects the specified bypass channel(s), where: ccc = bypass channel (1-511)
G	#	DSC CH {* *or* n:ss:c[-n:ss:c]...[,n:ss:c[-n:ss:c]]}[/T] **Description:** Disconnects specified I/O channel(s). Optional /T modifier disconnects specified I/O channels.
G	#	DSC DL {* *or* ss[-ss]…[,ss[-ss]]}[*option*] **Description:** Disconnects all originator channels connected over the specified intermachine link(s). *Option* is one of the following: /Ppr = disconnects only channels with specified priority level /Nxxxx = disconnects only channels that terminate at specified node /A = disconnects all originator, terminator, and bypass channels connected over the specified intermachine link(s)
G	#	DSC DS0 {* *or* n:ss:cc[-n:ss:cc]…[,n:ss:cc[-n:ss:cc]]}[/F *or* /T] **Description:** Disconnects specified DS-0 channel(s) and bundled DS-0 channels when master DS-0 channel is specified.
G	#	DSC ND {* *or* xxxx[-xxxx]…[,xxxx[-xxxx]]}[/Ppr] **Description:** Disconnects all channels originating at this node and terminating at specified node(s). Optional /Ppr modifier restricts disconnect request to channels with specified priority level. Does not affect bandwidth contention channels.
G	#	DSC POL {* *or* n:ss:c[-n:ss:c]…[,n:ss:c[-n:ss:c]]}[/A] **Description:** Disconnects specified channel from the defined broadcast/polling group. Optional /A modifier disconnects all broadcast/polling group members associated with specified master channel.

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	DSC PR {* *or* pr[-pr]…[,pr[-pr]]}[/Nxxxx] **Description:** Disconnects all channels originating at this node that have the specified priority level(s). Optional /Nxxxx modifier restricts disconnect request to specified termination node.
G	#	DSC PRO ppp[-ppp]…[,ppp[-ppp]][/D] DSC PRO/D **Description:** Disconnects all channels that have been assigned to the specified ABM profile(s). Does not affect bandwidth contention channels. Optional /D qualifier includes default ABM profile in the range.
	#	INS n:ss[-n:ss]...[,n:ss[-n:ss] *or* * **Description:** Logically inserts module into specified slot.
G	#	INS RTE xxxx p {ss, n:ss *or* 1:ss:bdl, *or* 1:ss:cc} *delay* **Description:** Adds a route to a routing table of specified node, where: *delay* = path delay number
	#	RMV n:ss[-n:ss]...[,n:ss[-n:ss]] **Description:** Logically removes module from specified slot.
G	#	SET ALM FWD {AQ *or* TAQ} **Description:** Defines which alarm queue will determine when node transmits "I have an Alarm" message to nodes on remote alarm notification list. AQ = Use the AQ alarm list TAQ = Use the TAQ alarm list
G	#	SET BIAS XCH n:ss:cc:sr[-n:ss:cc:sr] */routing* **Description:** Defines bias route over which an X.50 subrate channel will be connected to a remote node. *Routing* is one of the following: Lss[:cc] = bias intermachine link or bundle Lss[:cc]/O = odd-numbered subrate channels routed through the bias intermachine link or bundle Lss[:cc]/E = even-numbered subrate channels routed through the bias intermachine link or bundle OFF = terminate bias routing OFF/O = terminate bias routing only for odd-numbered subrate channels OFF/E = terminate bias routing only for even-numbered subrate channels
G	#	SET BIAS XS0 n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]/*routing* **Description:** Defines bias routing at originator end of X.50 DS-0 channel(s). *Routing* is one of the following: Lss[:cc] = bias intermachine link or bundle Lss[:cc]/O = odd-numbered X.50 DS-0 channels routed through the bias intermachine link or bundle Lss[:cc]/E = even-numbered X.50 DS-0 channels routed through the bias intermachine link or bundle OFF = terminate bias routing OFF/O = terminate bias routing only for odd-numbered X.50 DS-0 channels OFF/E = terminate bias routing only for even-numbered X.50 DS-0 channels

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	SET BMP {E *or* P *or* D} **Description:** Enables or disables end-to-end or point-to-point bumping at a node E = enables end-to-end bumping only P = enables point-to-point bumping D = disables bumping
G	#	SET CFG n:ss:cc=cc[-cc]…[,cc[-cc]][/A] SET CFG n:ss:cc/OFF **Description:** Defines the bundle configuration for each Integrated Trunk Module and Channelized Services Processor. When /A modifier is used, adds specified slave DS-0 channel(s) to an existing bundle. /OFF option clears master channel and all slave DS-0 channels associated with the specified master channel.
G	#	SET CH {n:ss:c-n:ss:c *or* n:ss:cc-n:ss:cc} {/Pppp} **Description:** Assigns an ABM profile (ppp) to channels.
G	#	SET CLK {1 *or* 2 *or* 3} **Description:** Selects one of the clock sources from clock fallback list as the system clock source, where: 1 = clock fallback 1 (primary) source 2 = clock fallback 2 source 3 = clock fallback 3 source
G	#	SET CQT {LO *or* HI} **Description:** Sets the clock qualification level of the nodal timing source (for NCL+ and NCL* Network Modules only).
G	#	SET CSW [QS *or* SS] **Description:** Sets the maximum time for the LINK/2+ System to qualify and start locking to an alternate clock source. QS sets the time to 17 seconds; SS to 30 seconds.
G	#	SET CTN {E *or* D *or* C} **Description:** Enables (E) or disables (D) ILP bandwidth contention on a call-demand basis, or forces a connection (C) between contention channels that are not busied out.
G	#	SET DL BCK {* *or* ss *or* 1:ss *or* 1:ss:cc} X {1:ss:cc *or* OFF *or* C} **Description:** Defines or cancels the proprietary bundle on an Integrated Trunk Module that backs up the intermachine link of an Interlink Module or another proprietary bundle of an Integrated Trunk Module, where: X = a delimiter (/, =, or a blank)
G	#	SET DL EXP {* *or* ss *or* 1:ss *or* 1:ss:cc} X {1:ss:cc *or* OFF *or* C} **Description:** Defines or cancels the proprietary bundle on an Integrated Trunk Module that can be used as an expansion link for the intermachine link of an Interlink Module or for another proprietary bundle of an Integrated Trunk Module, where: X = a delimiter (/, =, or a blank)
G	#	SET DRT rt **Description:** Defines the maximum number of redialing attempts for an ISDN or Switched 56 connection, where rt specifies the number of retries.

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	SET DTM tmo **Description:** Defines the delay between dialing retries for an ISDN or Switched 56 connection, where tmo specifies the timeout value in 30-second intervals.
G	#	SET GRM {E *or* D} **Description:** Enables (E) or disables (D) grooming of originator channels with profiles set for GRM=ENABLE.
G	#	SET GRM *day* $time_1$ $time_2$ **Description:** Sets the grooming day, disconnect time, and reconnect time on a system-wide basis. *day* = SUN, MON, TUE, WED, THU, FRI, SAT, or * for every day of the week $time_1$ = grooming disconnect time (hours:minutes), or C to clear disconnect time $time_2$ = grooming reconnect time (hours:minutes), or C to clear reconnect time
G	#	NOD xxxx SET GWY {CP *or* SP} **Description:** Sets supervisory computer port (CP) or supervisory port (SP) for gateway operation. Command must be directed to a remote node.
G	#	SET IO *hh* **Description:** Sets the ASCII character used to indicate a parity error in a QAM Module data stream, where: *hh* = hexadecimal equivalent of ASCII character
G	#	SET L1C {D *or* E} **Description:** Allows (E) users with password level 1 to issue CON and DSC commands or prohibits (D) users from issuing these commands.
G	#	SET MAP n:ss:cc:sr/*speed=timeslot* SET MAP n:ss:*/F*speed* **Description:** Defines the speed and time slot for the specified X.50 subrate channel on the X.50 Server Module, where: *speed* = speed of subrate channel in bps *timeslot* = X.50 timeslot the specified subrate channel will occupy * = all X.50 DS-0 channels /F = fill all timeslots with defined speed
G	#	SET PHN BCK {1:ss:cc=phn[/D *or* /I][/H0] *or* 1:ss:cc[/C *or* /D *or* /I][/H0] *or* 1:ss:*/C} **Description:** Enters or clears phone numbers for backup Switched 56 or ISDN connections for specified Interlink or Integrated Trunk Module, where: phn = phone number (20 characters maximum for ISDN connections; 16 characters maximum for Switched 56 connections) /D = domestic /I = international /C = clears phone numbers /H0 = H0-channel

Table 6-1. Configuration Commands (Cont'd)

G	N	Command
G	#	SET PHN XDL {1:ss:cc=phn[/D *or* /I][/H0] *or* 1:ss:cc [/C *or* /D *or* /I][/H0] *or* 1:ss:*/C} **Description:** Enters or clears phone numbers for Switched 56 or ISDN expansion connections for specified Integrated Trunk Module, where: phn = phone number (20 characters maximum for ISDN connections; 16 characters maximum for Switched 56 connections) /D = domestic /I = international /C = clears phone numbers /H0 = H0-channel
G	#	SET PRO {* *or* ppp[-ppp]…[,ppp[-ppp]]}/*parameter=value* **Description:** Modifies parameters within existing ABM profiles. *Parameters* and their *values* are: ENC = {D *or* R} SDT = {0 *or* 1 *or* 2 *or* 3 *or* 4 *or* 5 *or* 6 *or* D} EPR = {D *or* V *or* G *or* F} GRP = {D *or* 1 *or* 2 *or* 3 *or* 4 *or* 5 *or* 6 *or* 7} GRM = {D *or* E} BMP = {D *or* E *or* R *or* B} BLV = {1 *or* 2 *or* 3 *or* 4} OVR = {D *or* E}
G	#	SET RDN [n:]ss **Description:** Sets redundancy for Interlink Module, Integrated Trunk Module, Channelized Services Processor, D-Channel Module, and Voice Processor pairs; and resets both modules of the redundant pair.
G	#	SET SEC **Description:** Enables nodal security; restricts the node from accepting global gateway commands.
G	#	SET TSA n:ss[-n:ss]…[,n:ss[-n:ss]]=cc[-cc]…[,cc[-cc]] **Description:** Sets time slot assignments for bundle A of Link Framing Module (Models LFM.10, .11, .12 only).
G	#	SET TSA n:ss[-n:ss]…[,n:ss[-n:ss]]/OFF **Description:** Clears time slot assignments of bundle A of Link Framing Module (Models LFM.10, .11, .12 only).
G	#	SET TSB n:ss[-n:ss]…[,n:ss[-n:ss]]={cc[-cc]…[,cc[-cc]] **Description:** Sets time slot assignments for bundle B of Link Framing Module (Models LFM.10, .11, .12 only).
G	#	SET TSB n:ss[-n:ss]…[,n:ss[-n:ss]]/OFF **Description:** Clears time slot assignments of bundle B of Link Framing Module (Models LFM.10, .11, .12 only).
G	#	SET VSM n:ss[-n:ss]...[,n:ss[-n:ss]] **Description:** Defines the specified module(s) as a Voice Server Module.
G	#	SET XSM n:ss[-n:ss]…[,n:ss[-n:ss]] [/R] **Description:** Defines the specified module(s) as a primary or redundant X.50 Server Module.

Table 6-1. Configuration Commands (Cont'd)

G	N	Command

G entry in "G" column indicates a nonglobal gateway command.
entry in "N" column indicates that a command can be issued to a remote node by preceding the command with NOD xxx.

c	=	I/O channel number (1 to 4)
cc	=	DS-0 channel number (1 to 31) or X.50 DS-0 channel number (1 to 16)
ccc	=	bypass channel number (1 to 511)
cpr	=	clock priority level (1 to 16)
n	=	nest number: 1 = Control Mainframe; 2 = Expander A Mainframe (upper); 3 = Expander B Mainframe (lower)
n:ss:c	=	specifies single channel
n:ss:c,n:ss:c	=	specifies two or more channels
n:ss:c - n:ss:c	=	specifies range of channels in ascending order
n_D:ss_D:c_D	=	when defining channel connections, specifies destination I/O channel
n_D:ss_D:cc_D	=	when defining channel connections, specifies destination DS-0 channel
n_D:ss_D:cc_D:sr_D	=	when defining channel connections, specifies destination X.50 subrate channel
n_L:ss_L:c_L	=	when defining channel connections, specifies local I/O channel
n_L:ss_L:cc_L	=	when defining channel connections, specifies local DS-0 channel
p	=	path number (1 to 8) of path defined in routing table
pp	=	phasor size (8, 10, 12, or 14)
ppp	=	ABM profile (1 to 250 or D for default)
pr	=	connect priority level (1 to 16)
sp	=	speed profile (1 to 16)
sr	=	X.50 subrate channel number (1 to 20)
ss	=	slot number
tt	=	time in seconds (2, 4, 6, 8, 10, 12, 14, or 16)
vp	=	voice profile (1 to 64)
xxxx	=	node number (1 to 2000)
zz	=	retry timer number (0, 2 to 16)
*	=	all elements in a range. Can also be used to specify all channels on a module, e.g., n:ss:*
[ ]	=	optional parameter. Brackets are never entered as part of command.
{ }	=	required parameter. Choose one of the elements within braces. Braces are never entered as part of command.
...	=	used before [ ] symbol to indicate command can be entered with several parameter values. Dots are never entered as part of command.

Verifying Parameters

Table 6-2 shows the typical activities needed when verifying system level, intermachine link, DS-1, ISDN D-channel, and channel programming. See Chapter 5, Display Commands, for sample displays of the commands used in Table 6-2.

Verifying parameters will not disrupt data flow.

Changing Parameters

Tables 6-3 through 6-18 show typical activities needed when changing:

- System parameters
- Intermachine link parameters and Integrated Trunk Module DS-1 parameters
- Routing
- Voice Processor DS-1/E-1 parameters, quality parameters, and DS-0 parameters
- Channelized Services Processor DS-1/E-1 parameters, quality parameters, master DS-0 parameters, and bundle configuration
- I/O channel parameters
- Channel connections
- Broadcast/polling group connections
- Voice compression connections
- ABM profiles
- Voice profiles
- X.50 DS-0 channels and X.50 subrate channels

In these examples, most programming is performed using remote supervisory port commands entered at a central site. Programming can also be performed locally. See "Guidelines for Performing Configuration Activities" paragraphs later in this chapter.

NOTE: *Parameter changes at one node may require corresponding changes at a remote node. If the local supervisory terminal cannot issue commands to the remote node, ensure that the required changes are made at the remote node before proceeding with the next activity.*

Adding Modules

In general, adding a module requires the following activities:

- If a module must be removed or relocated before the new module can be installed, use the DEL command to delete database entries for the module being removed.
- Use the RMV and INS commands to logically remove and insert modules.
- Define database parameters for the modules that have been added or relocated:
  - For Interlink Modules, define intermachine link parameters and routing tables. See Tables 6-4 and 6-5.
  - For Integrated Trunk Modules, define DS-1/E-1 parameters, bundle configurations, proprietary and nonproprietary bundle parameters, channel connections, D-channel parameters, and routing tables. See Tables 6-4 and 6-5.
  - For Voice Processors, define DS-1/E-1 parameters, quality parameters, DS-0 channel parameters, and channel connections. See Tables 6-6, 6-7, and 6-12.
  - For Channelized Services Processors, define DS-1/E-1 parameters, quality parameters, master DS-0 channel parameters, bundle configuration, and channel connections. See Tables 6-8, 6-9, 6-10, and 6-12.
  - For Voice Server Modules, use the SET VSM command to define the module.
  - For I/O modules, define channel connections and parameters. See Tables 6-11 and 6-12.
  - For X.50 Server modules, use SET XSM command to define the module, then define channel connections and parameters. See Table 6-18.

For more detailed information on adding modules to an existing LINK/2+ System, see Installing Additional Modules chapter in the LINK/2+ Installation and Maintenance Manual, which provides step-by-step procedures covering the physical installation as well as the programming activities required for each type of module.

Table 6-2. Typical Configuration Activities—Verifying Parameters

Activity	Command	Example
☐ Display system parameters.	DSP SY	NOD 9 DSP SY
☐ Display supervisory port parameters.	DSP SP	NOD 12 DSP SP
☐ Display supervisory computer port parameters.	DSP CP	NOD 12 DSP CP
☐ Display external port parameters.	DSP EP	NOD 12 DSP EP
☐ Display Integrated Trunk Module DS-1 parameters.	DSP ILQ	NOD 9 DSP ILQ 1:5
☐ Display Link Framing Module parameters.	DSP LFM	NOD 9 DSP LFM 1:9-1:12
☐ Display intermachine link parameters.	DSP DL	NOD 7 DSP DL *
☐ Display intranetwork routing parameters at any node.	DSP RTE	NOD 7 DSP RTE *
☐ Display Voice Processor DS-1 parameters.	DSP DS1	NOD 16 DSP DS1 *
☐ Display Channelized Services Processor DS-1 parameters.	DSP CSP	NOD 16 DSP CSP *
☐ Display quality parameters.	DSP QUA	NOD 16 DSP QUA *
☐ Display bundle configurations.	DSP CFG [/M]	NOD 16 DSP CFG */M
☐ Display nonproprietary bundle parameters.	DSP BDL NPR	NOD 16 DSP BDL NPR *
☐ Display proprietary bundle parameters.	DSP BDL PR	NOD 16 DSP BDL PR *
☐ Display I/O channel parameters.	DSP CH	NOD 16 DSP CH *
☐ Display Voice Processor DS-0 channel parameters.	DSP DS0	NOD 16 DSP DS0 *
☐ Display Channelized Services Processor DS-0 channel parameters.	DSP MDS0	NOD 16 DSP MDS0 *
☐ Display channel connections.	DSP DST *	NOD 16 DSP DST *
☐ Display internetwork channel connections at a transfer node.	DSP TRA	NOD 97 DSP TRA *
☐ Display broadcast/polling group connections.	DSP POL	NOD 16 DSP POL *
☐ Display ABM profile parameters.	DSP PRO	NOD 16 DSP PRO *
☐ Display voice profile parameters.	DSP VPR	NOD 16 DSP VPR *
☐ Display speed profile parameters.	DSP SPR	NOD 16 DSP SPR *
☐ Display ISDN D-Channel parameters.	DSP DCM	NOD 16 DSP DCM*
☐ Display link backup phone numbers.	DSP PHN BCK	NOD 16 DSP PHN BCK 1:5
☐ Display link expansion and dial link phone numbers.	DSP PHN XDL	NOD 16 DSP PHN XDL 1:5

Table 6-3. Typical Configuration Activities—Changing System Parameters

Activity	Command	Example
☐ Display current system parameters.	DSP SY	NOD 6 DSP SY
Change any of the following parameters, as required:		
☐ Define network clock type (default type is slave clocking node):		
• To designate node as a master clocking node, define the node as a master clocking node and assign a clock priority level.	DEF MM	NOD 6 DEF MM 1
• To define master clocking list for master clocking node:	DEF MCL	NOD 6 DEF MCL
- In response to system prompts, enter up to 15 master clocking node numbers on master clocking list.		ENTRY 01: 3 ENTRY 02: 7 • • • ENTRY 15:22
- Press RETURN key to store master clocking list and exit.	RETURN key	
• To set the permissible frequency range of the nodal timing source with Network Module classified as NCL+:		
- Set the clock qualification tolerance to low for a long-term frequency deviation from +22 ppm from nominal to -26 ppm from nominal.	SET CQT LO	NOD 6 SET CQT LO
- Set the clock qualification tolerance to high for a long-term frequency deviation from +45 ppm from nominal to -53 ppm from nominal.	SET CQT HI	
• To set the permissible frequency range of the nodal timing source with Network Module classified as NCL*:		
- Set the clock qualification tolerance to low for a long-term frequency deviation from ±10 ppm from nominal.	SET CQT LO	NOD 6 SET CQT LO
- Set the clock qualification tolerance to high for a long-term frequency deviation from ±32 ppm from nominal.	SET CQT HI	
• Set 17 seconds as the maximum time interval for the LINK/2+ System to qualify and start locking to an alternate clock source.	SET CSW QS	NOD 6 SET CSW QS
• Allow the LINK/2+ System up to 30 seconds to qualify and start locking to an alternate clock source.	SET CSW SS	NOD 6 SET CSW SS
• To designate node as a slave clocking node if node was previously defined as a master clocking node, clear node from being a master clocking node.	CLR MC, CLR FMC, or CLR MM	NOD 10 CLR MM
• Verify parameter changes.	DSP ST CLK	NOD 6 DSP ST CLK
• Repeat above steps to define additional master clocking nodes (up to 16 master clocking nodes are permitted).		
☐ Define routing table type:		
• To designate node for nonregionalized routing, set the routing tables as nonregionalized.	CLR REG	

Table 6-3. Typical Configuration Activities—Changing System Parameters (Cont'd)

Activity	Command	Example
☐ Set nodal security:		
• To restrict the node from accepting global gateway commands, enable nodal security.	SET SEC	NOD 6 SET SEC
• To allow the node to accept global gateway commands, disable nodal security.	CLR SEC	
☐ Define or clear passwords:		
• To define password 1:	DEF PW1	NOD 6 DEF PW1
- In response to system prompts, enter old/default password.		TIMEPLEX
- Enter new password.		DATAFLEX
- Enter the new password again.		DATAFLEX
• To define password 2:	DEF PW2	NOD 6 DEF PW2
- In response to system prompts, enter old/default password.		TIMEPLEX
- Enter new password.		MANAGER
- Enter the new password again.		MANAGER
• To clear passwords and disable password protection:	CLR PW	NOD 6 CLR PW
- In response to system prompt, enter password 2.		MANAGER
☐ Set or clear the supervisory port timeout.	SET TMO or CLR TMO	NOD 6 SET TMO
☐ Set or clear the supervisory port display of unsolicited messages.	SET MUM or CLR MUM	NOD 6 SET MUM LOC
☐ Define system connect retry timer.	DEF RET	NOD 7 DEF RET 2
☐ Define intermachine link out-of-service time.	DEF OOS	NOD 11 DEF OOS 8
☐ Define system maximum phasor size:		
• Disconnect channels using the system maximum phasor size.	DSC CH	NOD 8 DSC CH 1:8:1-1:8:4
• Specify the system maximum phasor size.	DEF PSZ	NOD 8 DEF PSZ 14
• Reconnect channels.	CON CH	NOD 8 CON CH 1:8:1-1:8:4
☐ Define system clock fallback list:		
• Define clock fallback 1 (primary) source.	DEF CFB 1	NOD 6 DEF CFB 1 DLR 2
• Define clock fallback 2 source.	DEF CFB 2	NOD 6 DEF CFB 2 DLR 5
• Define clock fallback 3 source.	DEF CFB 3	NOD 6 DEF CFB 3 SKP
☐ Define alarm notification list:	DEF ALM	NOD 2 DEF ALM
• In response to system prompts, enter up to 16 node numbers on alarm notification list.		ALARM 01: 3 ALARM 02: 7 • • • ALARM 16:22
• Press RETURN key to store alarm notification list and exit.	RETURN key	

Table 6-3. Typical Configuration Activities—Changing System Parameters (Cont'd)

Activity	Command	Example
☐ Define station clock speed:	DEF SC	NOD 20 DEF SC Current station clock speeds are displayed, one at a time.
• Use F key or B key to scroll to new parameter value for station clock 1 speed.	F key or B key	
• Press RETURN key to display station clock 2 speed.	RETURN key	
• Use F key or B key to scroll to new parameter value for station clock 2 speed.	F key or B key	
• Press RETURN key to store station clock speeds and exit.	RETURN key	
☐ Define asynchronous I/O error character by entering 2-digit hexadecimal number.	SET IO	NOD 15 SET IO BF
☐ Set contention:		
• To enable contention on a call demand basis and disable bandwidth pooling.	SET CTN	SET CTN E
• To disable contention and enable bandwidth pooling. When contention is disabled, all DS-0 channels assigned to contention return bandwidth to the bandwidth pool.	SET CTN	SET CTN D
• To force a connection between contention channels that are not busied out.	SET CTN	SET CTN C
☐ Set bumping:		
• To enable bumping on an end-to-end basis for channels originating at the node.	SET BMP	SET BMP E
• To enable bumping on a point-to-point basis for channels originating at the node.	SET BMP	SET BMP P
• To disable bumping for channels originating at the node.	SET BMP	SET BMP D
☐ Set system grooming flag:		
• To enable grooming	SET GRM	SET GRM E
• To disable grooming.	SET GRM	SET GRM D
☐ Clear system grooming day and time.	SET GRM	SET GRM * C C
☐ Set system grooming day and time.	SET GRM	SET GRM MON 10:00 12:00
☐ Set dial-up retry.	SET DRT	SET DRT 2
☐ Set dial-up timer.	SET DTM	SET DTM 4
☐ Verify parameter changes.	DSP SY	NOD 16 DSP SY
☐ Update configuration worksheets.		

Table 6-4. Typical Configuration Activities— Changing Intermachine Link and Bundle Parameters

Activity	Command	Example
☐ Disconnect all channels connected over the affected intermachine link(s) or bundle(s). **NOTE** When the DSC DL command is used with the /A modifier, the LINK/2+ System disconnects all originator, terminator, and bypass channels connected over the specified intermachine link but does NOT attempt to reestablish the connections over an alternate path; channels must be reconnected with the CON CH and CON DS0 commands. Other commands can be used to disconnect channels at the originator end of the channel connections; see Table 6-1 for commands. **NOTE** Do not use the DSC BDL command if there are no alternate paths to the remote end. Instead: 1. Disconnect all I/O over affected link. 2. Define remote link parameters. 3. Reset the remote bundle. 4. Define local link parameters. 5. Reset the local bundle.	DSC DL DSC BDL	NOD 11 DSC DL 3/A NOD 11 DSC BDL 1:9:5/F
☐ Specify intermachine link(s) or bundle(s) to be changed.	DEF DL DEF BDL PR	NOD 11 DEF DL 3 Current intermachine link parameters are displayed. NOD 11 DEF BDL PR 1:9:5 Current proprietary bundle parameters are displayed.
☐ Change parameters:		
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE Bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters.		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP DL DSP BDL PR	NOD 11 DSP DL 3 NOD 11 DSP BDL PR 1:9:5 Current parameters are displayed.

Table 6-4. Typical Configuration Activities— Changing Intermachine Link and Bundle Parameters (Cont'd)

Activity	Command	Example
☐ If required, change parameters at other end of intermachine link and verify parameter changes. **NOTE** See the Intermachine Link Parameters chapter in the Configuration Planning Manual for intermachine link parameters that must be the same at both ends of the connection.	DEF DL DSP DL DEF BDL PR DSP BDL PR	NOD 17 DEF DL 5 NOD 17 DSP DL 5 NOD 21 DEF BDL PR 1:3:5 NOD 21 DSP BDL PR 1:3:5
☐ If intermachine link has redundant modules, enter SET RDN command to copy parameters from one Interlink or Integrated Trunk Module to the other. The SET RDN command automatically resets both modules in the redundant pair.	SET RDN	NOD 11 SET RDN 3 NOD 17 SET RDN 5 NOD 11 SET RDN 9 NOD 21 SET RDN 3
☐ If intermachine link does not have redundant modules, reset Interlink Module or bundle.	RST RST BDL	NOD 11 RST 1:3 NOD 17 RST 1:5 NOD 11 RST BDL 1:9:5
☐ If required, reconnect channels at the originator end of the channel connection.	CON CH, CON DS0	NOD 11 CON CH 2:1:1-2:5:4 NOD 17 CON CH 1:10:1-1:12:4
☐ Update configuration worksheets.		

Table 6-5. Typical Configuration Activities—Routing

Activity	Command	Example
☐ Display current routing for node.	DSP RTE	NOD 5 DSP RTE * Routing tables for all destination nodes of node 5 are displayed.
☐ If required, clear existing routing table for specified destination node.	CLR RTE	NOD 5 CLR RTE 2
☐ Define routing table:		
• To define routing table in **any order** of path delay, use the /F modifier to specify the preferred order of routing:		
– Specify destination node.	DEF RTE /F	NOD 5 DEF RTE 2/F
– In response to system prompts, define up to eight paths. Each path is specified by: a. Intermachine link and bundle number (for Integrated Trunk Module only) b. Path delay		PATH 1 DL = 3:1 PATH 1 PD = 2 PATH 2 DL = 5 PATH 2 PD = 0 • • • PATH 8 DL = 9 PATH 8 PD = 7
– Press RETURN key to store routing table and exit.	RETURN key	
• To define routing in **ascending order** of path delay		
– Specify destination node.	DEF RTE	NOD 5 DEF RTE 3
– In response to system prompts, define up to eight paths. Each path is specified by: a. Intermachine link and bundle number (for Integrated Trunk Module only) b. Path delay		PATH 1 DL = 5 PATH 1 PD = 0 PATH 2 DL = 3:1 PATH 2 PD = 2 • • • PATH 8 DL = 9 PATH 8 PD = 7
– Press RETURN key to store routing table and exit.	RETURN key	
☐ Display system parameters to determine if the routing tables are defined as regionalized or nonregionalized:	DSP SY	NOD 5 DSP SY
• For nonregionalized routing tables, repeat above steps to define routing to every node in the network.		
☐ Verify routing.	DSP RTE	NOD 5 DSP RTE 2
☐ Update configuration worksheets.		
If required, convert or define bias routing for I/O and DS-0 channels:		
☐ Display current bias routing.	DSP DST CH, DSP DST DS0, or DSP DST *	NOD 5 DSP DST *
☐ Disconnect channels whose bias route will be changed.	DSC CH or DSC DS0	NOD 5 DSC CH 2:6:1-2:6:4

Table 6-5. Typical Configuration Activities—Routing (Cont'd)

Activity	Command	Example
☐ Convert or define bias routing:		
• To convert bias routing, specify the intermachine links to be changed.	CNV BIAS	NOD 5 CNV BIAS 12 11
• To define I/O or DS-0 channel bias routing, specify the intermachine link bias route.	DEF BIAS CH or DEF BIAS DS0	NOD 5 DEF BIAS CH 2:6:1-2:6:4/L11
☐ Reconnect channels.	CON CH or CON DS0	NOD 5 CON CH 2:6:1-2:6:4
☐ Verify bias routing	DSP DST CH, DSP DST DS0, or DSP DST *	NOD 5 DSP DST *
☐ Update configuration worksheets.		

Table 6-6. Typical Configuration Activities—Changing Voice Processor DS-1/E-1 and Quality Parameters

Activity	Command	Example
☐ Disconnect all DS-0 channels on affected Voice Processor:		
• Determine the connect status and destination node of all DS-0 channels on affected Voice Processor.	DSP DST DS0	NOD 11 DSP DST DS0 1:7:*
• Determine the originator end of all connected DS-0 channels on affected Voice Processor.	DSP DS0	NOD 11 DSP DS0 1:7:*
• Disconnect all connected DS-0 channels on the affected Voice Processor at the originator end of the channel connection.	DSC DS0	NOD 11 DSC DS0 1:7:1-1:7:10 NOD 15 DSC DS0 1:9:5-1:9:10
• Verify channels are disconnected.	DSP DST DS0	NOD 11 DSP DST DS0 1:7:*
☐ Specify DS-1 or E-1 trunk(s) to be changed.	DEF DS1	NOD 11 DEF DS1 1:7 Current DS-1 or E-1 parameters are displayed.
☐ Change parameters.		
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters.		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP DS1	NOD 11 DSP DS1 1:7 Current DS-1 or E-1 parameters are displayed.
☐ If redundant Voice Processors are used, enter SET RDN command to copy parameters from one Voice Processor to the other. The SET RDN command automatically resets both Voice Processors in the redundant pair.	SET RDN	NOD 11 SET RDN 1:7
☐ If redundant Voice Processors are not used, reset Voice Processor.	RST	NOD 11 RST 1:7
☐ Connect all noncontending DS-0 channels on affected Voice Processor at the originator end of the channel connection.	CON DS0	NOD 11 CON DS0 1:7:1-1:7:10 NOD 15 CON DS0 1:9:5-1:9:10
☐ Specify DS-1 or E-1 trunk(s) whose quality parameters are to be changed.	DEF QUA	NOD 11 DEF QUA 1:7
☐ Change parameters:		
• Press RETURN key to advance cursor to parameter to be changed.	RETURN key	
• Use F key or B key to scroll to new parameter values for the first four parameters.	F key or B key	
• Enter numbers from the keyboard for the last three parameters.	Numeric keys	
• Press RETURN key after final parameter to store all parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP QUA	NOD 11 DSP QUA 1:7 Current quality parameters are displayed.
☐ Update configuration worksheets.		

Table 6-7. Typical Configuration Activities—Changing Voice Processor DS-0 Channel Parameters

Activity	Command	Example
☐ Disconnect channel(s) to be changed at the originator end of the channel connection.	DSC DS0	NOD 31 DSC DS0 1:8:1-1:8:10
☐ Verify channels are disconnected.	DSP DST DS0	NOD 31 DSP DST DS0 1:8:1-1:8:10
☐ Specify channel(s) to be changed.	DEF DS0	NOD 31 DEF DS0 1:8:1-1:8:10 Current channel parameters are displayed.
☐ Change parameters:		
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters.		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP DS0	NOD 31 DEF DS0 1:8:1-1:8:10 Current channel parameters are displayed.
☐ If required, change parameters at other end of the channel connection and verify parameter changes.	DEF DS0 or DEF MDS0 DSP DS0 or DSP MDS0	NOD 17 DEF DS0 1:10:1-1:10:10 NOD 17 DSP DS0 1:10:1-1:10:10
NOTE See the Digital Voice and Channelized Services Parameters chapter in the Configuration Planning Manual for channel parameters that must be the same at both ends of the channel connection.		
☐ Connect noncontending channels at the originator end of the channel connection.	CON DS0	NOD 31 CON DS0 1:8:1-1:8:10
☐ Update configuration worksheets.		

Table 6-8. Typical Configuration Activities—Changing Channelized Services Processor DS-1/E-1 and Quality Parameters

Activity	Command	Example
☐ Disconnect all DS-0 channels on affected Channelized Services Processor:		
• Determine the connect status and destination node of all DS-0 channels on affected Channelized Services Processor.	DSP DST DS0	NOD 11 DSP DST DS0 1:9:*
• Determine the originator end of all connected DS-0 channels on affected Channelized Services Processor.	DSP MDS0	NOD 11 DSP MDS0 1:9:*
• Disconnect all connected DS-0 channels on the affected Channelized Services Processor at the originator end of the channel connection.	DSC DS0	NOD 11 DSC DS0 1:9:1-1:9:10 NOD 15 DSC DS0 1:11:5-1:11:10
• Verify channels are disconnected.	DSP DST DS0	NOD 11 DSP DST DS0 1:9:*
☐ Specify DS-1 or E-1 trunk(s) to be changed.	DEF CSP	NOD 11 DEF CSP 1:9 Current DS-1 or E-1 parameters are displayed.
☐ Change parameters:		
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters.		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP CSP	NOD 11 DSP CSP 1:9 Current DS-1 or E-1 parameters are displayed.
☐ If redundant Channelized Services Processors are used, enter SET RDN command to copy parameters from one Channelized Services Processor to the other. The SET RDN command automatically resets both Channelized Services Processors in the redundant pair.	SET RDN	NOD 11 SET RDN 1:9
☐ If redundant Channelized Services Processors are not used, reset Channelized Services Processor.	RST	NOD 11 RST 1:9
☐ Connect all DS-0 channels on affected Channelized Services Processor at the originator end of the channel connection.	CON DS0	NOD 11 CON DS0 1:9:1-1:9:10 NOD 15 CON DS0 1:11:5-1:11:10
☐ Specify DS-1 or E-1 trunk(s) whose quality parameters are to be changed.	DEF QUA	NOD 11 DEF QUA 1:9

Table 6-8. Typical Configuration Activities—Changing Channelized Services Processor DS-1/E-1 and Quality Parameters (Cont'd)

Activity	Command	Example
☐ Change parameters:		
• Press RETURN key to advance cursor to parameter to be changed.	RETURN key	
• Use F key or B key to scroll to new parameter values for the first four parameters.	F key or B key	
• Enter numbers from the keyboard for the last three parameters.	Numeric keys	
• Press RETURN key after final parameter to store all parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP QUA	NOD 11 DSP CSP 1:9 Current quality parameters are displayed.
☐ Update configuration worksheets.		

Table 6-9. Typical Configuration Activities—Changing Channelized Services Processor DS-0 Channel Parameters

Activity	Command	Example
☐ Disconnect channel(s) to be changed at the originator end of the channel connection.	DSC DS0	NOD 10 DSC DS0 1:8:1-1:8:10
☐ Verify channels are disconnected.	DSP DST DS0	NOD 10 DSP DST DS0 1:8:1-1:8:10
☐ Specify channel(s) to be changed.	DEF MDS0	NOD 10 DEF MDS0 1:8:1-1:8:10 Current channel parameters are displayed.
☐ Change parameters:		
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP MDS0	NOD 10 DSP MDS0 1:8:1-1:8:10 Current channel parameters are displayed.
☐ If required, change parameters at other end of the channel connection and verify parameter changes. **NOTE** See the Digital Voice and Channelized Services Parameters chapter in the Configuration Planning Manual for channel parameters that must be the same at both ends of the channel connection.	DEF DS0, DEF MDS0, or DEF CH/ DSP DS0, DSP MDS0, or DSP CH	NOD 12 DEF DS0 1:10:1-1:10:10 NOD 12 DSP DS0 1:10:1-1:10:10
☐ Connect channels at the originator end of the channel connection.	CON DS0	NOD 10 CON DS0 1:8:1-1:8:10
☐ Update configuration worksheets.		

Table 6-10. Typical Configuration Activities—Changing Bundle Configuration

Activity	Command	Example
☐ Display the current bundle configuration.	DSP CFG [/M]	NOD 7 DSP CFG */M
☐ Disconnect master DS-0 channel(s) to be changed at the originator end of the channel connection.	DSC DS0	NOD 7 DSC DS0 1:16:2
☐ Verify master DS-0 channel(s) are disconnected.	DSP DST DS0	NOD 7 DSP DST DS0 1:16:2
☐ Specify new bundle configuration.	SET CFG	NOD 7 SET CFG 1:16:2 = 4, 6, 8
NOTE See LINK/2+ Configuration Planning Manual for bundle configuration guidelines.		
☐ Verify bundle configuration changes.	DSP CFG [/M]	NOD 7 DSP CFG 1:16/M
☐ If required, change parameter values of the master DS-0 channel(s):	DEF MDS0	NOD 7 DEF MDS0 1:16:2
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters.		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP MDS0	NOD 7 DSP MDS0 1:16:2
☐ If required, change parameters at other end of the channel connection and verify parameter changes.	DEF MDS0, DEF DS0, or DEF CH/ DSP MDS0, DSP DS0, or DSP CH	NOD 10 DEF MDS0 1:18:1 NOD 10 DSP MDS0 1:18:1
☐ Connect master DS-0 channel(s) at the originator end of the channel connection.	CON DS0	NOD 7 CON DS0 1:16:2
☐ Update configuration worksheets.		

Table 6-11. Typical Configuration Activities—Changing I/O Channel Parameters

Activity	Command	Example
☐ At the originator end of the channel connection, disconnect channels.	DSC CH	NOD 31 DSC CH 1:8:1-1:8:4
☐ Verify channels are disconnected.	DSP CON	NOD 31 DSP CON 1:8:1-1:8:4
☐ Specify I/O channel type and channel(s) to be changed.	DEF CH/	NOD 31 DEF CH/QSC 1:8:1-1:8:4 Current channel parameters are displayed.
☐ Change parameters:		
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters.		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP CH	NOD 31 DSP CH 1:8:1-1:8:4 Current channel parameters are displayed.
☐ If required, change parameters at other end of the channel connection and verify parameter changes. **NOTE** See the Synchronous Channel Parameters chapter in the Configuration Planning Manual for channel parameters that must be the same at both ends of the channel connection.	DEF CH/ DSP CH	NOD 17 DEF CH/QSC 1:10:1-1:10:4 NOD 17 DSP CH 1:10:1-1:10:4
☐ At the originator end of the channel connection, connect channels.	CON CH	NOD 31 CON CH 1:8:1-1:8:4
☐ Update configuration worksheets.		

Table 6-12. Typical Configuration Activities—Defining Channel Connections

Activity	Command	Example
☐ Display current channel connections.	DSP DST *	NOD 3 DSP DST * Currently defined channel connections for all channels at node 3 are displayed.
☐ At originator end of the channel connection, disconnect channels.	DSC CH or DSC DS0	NOD 3 DSC CH 1:5:*
☐ To define channel connections over an intermachine link for connections that do not require a transfer node:		
• Define channel connections.	DEF DST CH or DEF DST DS0	NOD 3 DEF DST CH 1:5:*/N12 C1:6:*
• Define corresponding channel connections for other end of the connection.	DEF DST CH or DEF DST DS0	NOD 12 DEF DST CH 1:6:*/N3 C1:5:*
• Repeat above steps as required to define all T-1/E-1 channel connections.		
• Verify channel connections.	DSP DST *	NOD 3 DSP DST *
• At originator end of the channel connection, connect channels.	CON CH or CON DS0	NOD 3 CON CH 1:5:*
☐ To define DS-0 channel connections that do not require a transfer node:		
• Define local channel connections.	DEF DST CH or DEF DST DS0	NOD 6 DEF DST CH 1:4:*/N6 DS0
• Define corresponding local Voice Processor or Channelized Services Processor connections for other end of the connection.	DEF DST DS0	NOD 6 DEF DST DS0 1:10:1-1:10:4/N6 C1:4:*
• Define remote channel connections.	DEF DST CH or DEF DST DS0	NOD 10 DEF DST CH 1:8:*/N10 DS0
• Define corresponding remote Voice Processor or Channelized Services Processor connections for other end of the connection.	DEF DST DS0	NOD 10 DEF DST DS0 1:12:1-1:12:4/N10 C1:8:*
• Repeat above steps as required to define all DS-1 channel connections.		
• Verify channel connections.	DSP DST *	NOD 6 DSP DST * NOD 10 DSP DST *
• At local node, connect the originator channels.	CON CH or CON DS0	NOD 6 CON DS0 1:10:1-1:10:4

Table 6-12. Typical Configuration Activities—Defining Channel Connections (Cont'd)

Activity	Command	Example
• At remote node, connect the originator channels.	CON CH or CON DS0	NOD 10 CON DS0 1:12:1-1:12:4
☐ To define channel connections over an intermachine link for connections that require a transfer node:		
• Define local channel connections to transfer node.	DEF DST CH	NOD 11 DEF DST CH 2:1:3/N252 C1:8:1
• Set transfer node translation table entry.	SET TRA	NOD 129 SET TRA 1:8:9/N11 2:1:3/N101 1:6:4
• Define corresponding channel connections to transfer node for other end of the connection.	DEF DST CH	NOD 129 S 101 DEF DST CH 1:6:4/N129 C1:8:1
• Repeat as required to define all T-1/E-1 channel connections.		
• Verify channel connections.	TRC SUB or TRC BCK	NOD 129 TRC SUB N11 2:1:3
• At originator end of the channel connection, connect channels.	CON CH	NOD 11 CON CH 2:1:3
☐ Update configuration worksheets.		

Table 6-13. Typical Configuration Activities— Changing Broadcast/Polling Master and Group Connections

Activity	Command	Example
☐ Display current broadcast/polling group connections.	DSP POL	NOD 12 DSP POL *
☐ Disconnect the originator host channel connection associated with the master broadcast/polling channel to be changed.	DSC CH	NOD 5 DSC CH 1:18:3
☐ Verify originator host channel is disconnected.	DSP DST CH	NOD 5 DSP DST CH 1:18:3
☐ Clear and disconnect the master broadcast/polling channel and broadcast/polling group members to be changed.	CLR POL [/A]	NOD 12 CLR POL 1:17:1/A
☐ Verify master broadcast/polling channel and broadcast/polling group members are disconnected.	DSP POL [/A]	NOD 12 DSP POL 1:17:1/A
☐ If required, change channel parameters:		
• Specify channel(s) to be changed.	DEF CH/QSP	NOD 12 DEF CH/QSP 1:17:1-1:17:4
• Press SPACE bar to advance cursor to parameter to be changed	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters.		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify parameter changes.	DSP CH	NOD 12 DSP CH 1:17:1-1:17:4
☐ Define master broadcast/polling channel.	DEF MSR POL	NOD 12 DEF MSR POL 1:17:4
☐ Define broadcast/polling group members.	DEF POL	NOD 12 DEF POL 1:17:1-1:17:3/M 1:17:4
☐ Define the connection between the originator host channel and master broadcast/polling channel at both ends.	DEF DST CH	NOD 5 DEF DST CH 1:18:3/N12 C1:17:4 NOD 12 DEF DST CH 1:17:4/N5 C1:18:3
☐ Connect the originator host channel.	CON CH	NOD 5 CON CH 1:18:3
☐ Update configuration worksheets.		

Table 6-14. Typical Configuration Activities—Defining Voice Compression Connections

Activity	Command	Example
☐ Logically insert the Voice Server Module.	INS	INS 1:10
☐ Define the Voice Server Module.	SET VSM	SET VSM 1:10
☐ Define voice profile(s):	DEF VPR	DEF VPR 2
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• After all changes are made, press RETURN key to store parameters and exit.	RETURN key	
NOTE To define a voice profile for voice compression, select 8000 or 16000 for compression speed.		
☐ Verify defined voice profiles.	DSP VPR	DSP VPR 2
☐ To assign a voice profile to undefined channel(s):		
• Define the I/O or DS-0 channel as follows:	DEF CH/, DEF DS0, or DEF BDL NPR	DEF DS0 1:12:1-1:12:8
- Press SPACE bar to advance cursor to voice profile parameter to define.	SPACE bar	
- Use F key or B key to scroll to new parameter value.	F key or B key	
- Repeat above steps to change additional parameters.		
- After all changes are made, press RETURN key to store parameters and exit.	RETURN key	
☐ To assign a voice profile to defined channel(s):		
• Display current channel connections.	DSP DST *	DSP DST *
• If the channel is connected, disconnect the channel.	DSC CH [/T], DSC BDL, or DSC DS0 [/T]	DSC DS0 1:13:1
• Assign a voice profile to the channel.	DEF CH/, DEF DS0, or DEF BDL NPR	DEF CH/EVM 1:13:1
• At the originator end of the channel connection, connect the channel.	CON CH, CON BDL, or CON DS0	CON DS0 1:13:1
☐ Define channel connections.	DEF DST CH or DEF DST DS0	DEF DST DS0 1:12:1-1:12:8/N22 D1:6:9-1:6:16 NOD 22 DEF DST DS0 1:6:9-1:6:16/N3 D1:12:1-1:12:8
☐ Update configuration worksheets.		

Table 6-15. Typical Configuration Activities— Setting and Assigning Advanced Bandwidth Management (ABM) Profiles

Activity	Command	Example
☐ Delete old ABM profile that is no longer to be used.	CLR PRO	CLR PRO 10
☐ Define new ABM profile parameters:	DEF PRO	DEF PRO 10
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to display next line of parameters.	RETURN key	
• Repeat above steps to change additional parameters.		
• After all changes have been made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify ABM profile changes.	DSP PRO	DSP PRO 10
☐ Modify a single parameter within an existing ABM profile.	SET PRO	SET PRO 10/EPR=D
☐ If required, change ABM profile at other nodes and verify changes.		
☐ Assign an ABM profile to a specified I/O or DS-0 channel.	SET CH	SET CH 1:10:1/P10
☐ Display all connections associated with this ABM profile.	DSP DST */P	DSP DST */P10
☐ Disconnect I/O and DS-0 channels assigned to the ABM profile.	DSC PRO	DSC PRO 10
☐ Define connection over an intermachine link:		
• Define channel connections.	DEF DST CH	DEF DST CH 1:10:1/N2 C1:5:1
• Define corresponding channel connections for destination end of connection.	DEF DST CH	NOD 2 DEF DST CH 1:5:1/N1 C1:10:1
☐ At originator end, connect channels that have been assigned to the designated ABM profile.	CON PRO	CON PRO 10
☐ Verify channel connection.	DSP DST CH	DSP DST CH */P10
☐ Update configuration worksheets.		

Table 6-16. Typical Configuration Activities—Assigning Voice Profiles

Activity	Command	Example
☐ Define new voice profile parameters:	DEF VPR	DEF VPR 2
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• After all changes are made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify voice profile changes.	DSP VPR	DSP VPR 2
☐ Assign the voice profile to a specified channel(s) as follows:		
• Display current channel connections.	DSP DST *	DSP DST *
• If the channel that is to be assigned the voice profile is connected, disconnect the channel.	DSC CH [/T], DSC BDL, or DSC DS0 [/T]	DSC DS0 1:13:1
• Assign the voice profile.	DEF CH/, DEF DS0, or DEF BDL NPR	DEF CH/EVM 1:13:1
• At the originator end of the channel connection, connect the channel.	CON CH, CON BDL, or CON DS0	CON DS0 1:13:1
☐ Verify channel connection.	DSP DST CH or DSP DST DS0	DSP DST DS0 1:13:1
☐ Update configuration worksheets.		

Adding or Reconfiguring a Node

Table 6-17 shows typical activities needed when adding a node to the network or when reconfiguring an existing node.

Table 6-17. Typical Configuration Activities—Adding or Reconfiguring a Node

Activity	Command	Example
☐ Set DIP switches for each module according to the procedure given in the LINK/2+ Installation and Maintenance Manual. **When adding a node to the network, the following programming must be done locally.** **NOTE** A supervisory terminal must be connected to local supervisory port. See "Accessing Supervisory Port" paragraph in Chapter 2, Getting Started. Supervisory port parameters and gateway status are initially defined by Network Module DIP switch settings. After the following local node programming has been defined, these parameters can be changed by DEF SP and CLR/SET GWY commands entered at a remote node.		
☐ Define node number.	DEF NOD	DEF NOD 35
☐ Reset node.	RST	RST 1:1
☐ Select supervisory port pagination:		
• For paginated output (23 lines per page) with a pause before printing each page	SET PG	SET PG
• For continuous output	CLR PG	CLR PG
☐ Define at least one route from the new node to the root node, i.e., the central site that has a network management computer or supervisory terminal for network control:		
• To define routing table in **any order** of path delay, use the /F modifier to specify the preferred order of routing:		
- Specify destination node. - In response to system prompts, define up to eight paths. Each path is specified by: a. Intermachine link b. Path delay	DEF RTE /F	NOD 5 DEF RTE 2/F PATH 1 DL = 3 PATH 1 PD = 2 PATH 2 DL = 5:2 PATH 2 PD = 0 • • • PATH 8 DL = 9 PATH 8 PD = 7
- Press RETURN key to store routing table and exit. - Repeat above steps as required to define routes for each node in the path from the new node to the root node.	RETURN key	

Table 6-17. Typical Configuration Activities—Adding or Reconfiguring a Node (Cont'd)

Activity	Command	Example
• To define routing in **ascending order** of path delay:		
- Specify destination node.	DEF RTE	NOD 4 DEF RTE 3
- In response to system prompts, define up to eight paths. Each path is specified by: a. Intermachine link b. Path delay		PATH 1 DL = 5 PATH 1 PD = 0 PATH 2 DL = 3 PATH 2 PD = 2 • • • PATH 8 DL = 9 PATH 8 PD = 7
- Press RETURN key to store routing table and exit.	RETURN key	
- Repeat above steps as required to define routes for each node in the path from the new node to the root node.		
☐ Define alarm notification list and ensure the node number of the root node is entered on list.	DEF ALM	DEF ALM
• In response to system prompts, enter up to 16 node numbers on alarm notification list.		ALARM 01:3 ALARM 02:7 • • • ALARM 16:22
• Press RETURN key to store alarm notification list and exit.	RETURN key	
The following programming can be done locally or from a remote site.		
☐ Define all system parameters.	See Table 6-3.	
☐ Define intermachine link parameters for all intermachine links.	See Table 6-4.	
☐ Define routing tables.	See Table 6-5.	
NOTE When adding a new node to the network, ensure that routing tables of other nodes in the network are updated to define routing to the new node.		
☐ Define DS-1/E-1 and quality parameters for all Voice Processor DS-1/E-1 trunks.	See Table 6-6.	
☐ Define DS-1/E-1 and quality parameters for all Channelized Services Processor DS-1/E-1 trunks.	See Table 6-8.	
☐ Define bundle configurations.	See Table 6-10.	
☐ Define channel parameters for all channels.	See Tables 6-7, 6-9, and 6-11.	
☐ Define ABM profiles.	See Table 6-15.	
☐ Define voice profiles.	See Table 6-16.	

Table 6-17. Typical Configuration Activities—Adding or Reconfiguring a Node (Cont'd)

Activity	Command	Example
☐ Define speed profiles.	DEF SPR	DEF SPR 3
☐ Define channel connections for all channels.	See Table 6-12.	
☐ Define broadcast/polling group connections.	See Table 6-13.	
☐ Define voice compression connections.	See Table 6-14.	
☐ Define/change supervisory port or supervisory computer port parameters. (Network Module DIP switch must be set to use database values.)	DEF SP or DEF CP	DEF CP Current supervisory computer port parameters are displayed.
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• Press RETURN key to store parameters and exit.	RETURN key	
☐ Select supervisory port or supervisory computer port gateway status. (Command must be entered from a remote node.)	SET GWY CP *or* SP CLR GWY CP *or* SP	NOD 14 SET GWY SP
☐ Initialize real time clock.	SET TIM	SET TIM 10:15:00
☐ Set date.	SET DAT	SET DAT 07-20-1989
☐ Verify all programming.	See Table 6-2.	
☐ Verify and record database checksum. Set database checksum, if necessary.	DSP CKS SET CKS DSP CKS	DSP CKS SET CKS DSP CKS
☐ Backup/save database to microcomputer or floppy disk to archive using the Database Backup procedure in Chapter 2, Getting Started.	SAV DB	SAV DB
☐ Verify database integrity using the CHECKDB.EXE program (provided with LINK/2+ operational software floppy disk package).		

Table 6-18. Typical Configuration Activities—Defining an X.50 Server Module Channel Connection

Activity	Command	Example
☐ Logically insert the X.50 Server Module.	INS	INS 1:3
☐ Define the X.50 Server Module.	SET XSM [/R]	SET XSM 1:3/R **NOTE:** /R indicates redundant module.
☐ Define X.50 DS-0 channels:	DEF XS0	DEF XS0 1:3:1
• Press SPACE bar to advance cursor to parameter to be changed.	SPACE bar	
• Use F key or B key to scroll to new parameter value.	F key or B key	
• Repeat above steps to change additional parameters.		
• After all changes are made, press RETURN key to store parameters and exit.	RETURN key	
☐ Verify defined X.50 DS-0 channels.	DSP XS0	DSP XS0 1:3:1
☐ Define destination between X.50 DS-0 and other module. Module may be another XSM, ILP, ILQ, CSP, QSC, or QSP.	DEF DST XS0	DEF DST XS0 1:3:1/N2000 D1:15:1, can also be X1:3:1 DEF DST XS0 1:15:1/N2000 D1:3:1
☐ Display channel connections.	DSP DST DS0	DSP DST 1:3:1 DSP DST DS0 1:15:1 DSP DST DS0 1:3:1/N2000 D1:15:1
☐ Connect X.50 DS-0 channels.	CON	CON 1:3:1
☐ Display status of X.50 DS-0 channels.	DSP ST XS0	DSP ST XS0 1:3
☐ Use SET MAP command to assign correct speed and time slot.	SET MAP	SET MAP 1:3:1:1/9600 = A
☐ Use DISPLAY MAP command to ensure that the mapping has been set as required.	DSP MAP	DSP MAP 1:3:1
☐ Define X.50 subrate channels.	DEF XCH	DEF XCH 1:3:1:1
☐ Display defined X.50 subrate channels.	DSP XCH	DSP XCH 1:3:1:1
☐ Define destination for X.50 subrate channels.	DEF DST XCH	DEF DST XCH 1:3:1:1/N2000 X1:15:1:1 or C1:10:1
☐ Verify defined X.50 subrate channel connections.	DSP DST	DSP DST 1:3:1:1
☐ Connect X.50 subrate channels.	CON	CON 1:3:1:1
☐ Display status of X.50 subrate channels.	DSP ST XCH	DSP ST XCH 1:3:1
☐ Display X.50 subrate channel connection.	DSP DST	DSP DST 1:3:1:1
☐ Update configuration worksheets.		

GUIDELINES FOR PERFORMING CONFIGURATION ACTIVITIES

Maintaining Configuration Records

For proper network maintenance and control, an accurate description of each node in the network is vital. To provide a record of node configuration:

- Update the configuration worksheets each time a configuration change is made.
- Maintain a chronological log of configuration activities showing the date, reason, and individual associated with each change.
- Update database file archives using the Database Backup procedure in Chapter 2, Getting Started.
- Verify database file archives integrity with the CHECKDB.EXE program (provided with the LINK/2+ operational software floppy disk package).

Performing Configuration Activities from a Local or Remote Site

Because most supervisory port commands can be directed to a remote node, the following approaches can be taken to configure a network:

- Configuration activities can be performed from the supervisory terminal at a central LINK/2+ System using remote commands. This centralized approach is especially useful for configuration tasks that affect several nodes in a network. To issue remote configuration commands from a local supervisory terminal:
  - The remote node must have the intermachine link security parameter disabled. See "Define Intermachine Link Parameters (DEF DL) Command" and "Define Proprietary Bundle Parameter (DEF BDL PR) Command" paragraphs.
  - The local supervisory port must be designated as a gateway port. See Network Module chapter in the LINK/2+ Installation and Maintenance Manual.
  - The node number of the remote node must be defined. See "Define Node Number (DEF NOD) Command" paragraph.
  - The local node number must be on the alarm notification list of the remote node. See "Define Alarm Notification List (DEF ALM) Command" paragraph.
  - At least one route between the local and remote nodes must be defined for each node in the path. See "Define and Clear Routing Table (DEF RTE, CLR RTE) Commands" paragraph.
- Configuration activities can be performed at each LINK/2+ System using a local supervisory terminal. Local configuration changes are allowed as long as the local supervisory port is designated as a gateway port.
- Configuration activities can be performed using the TIME/VIEW NMS connected to the LINK/2+ System.

Parameter Effectivity

Parameter changes take effect as follows:

- **System parameters—**Changes to most system parameters are implemented immediately upon entry of the command.

  Exceptions are:

  - Intermachine link out-of-service timer; requires reset of affected Interlink Module(s). For Integrated Trunk Modules, resetting one proprietary bundle changes the out-of-service timer for all proprietary bundles on the module. Affects intermachine links with individual out-of-service timer programmed as **SYS** only.

  - System maximum phasor size; requires disconnect of affected channels to change, and subsequent reconnect of those channels to take effect

  - System I/O parameter; requires disconnect of affected channels to change, and subsequent reconnect of those channels to take effect

  Most system parameters can have different values at each node, so changes made at one node do not necessarily require changes at another node.

- **Intermachine link parameters—**Changes to most intermachine link parameters are not implemented until the Interlink Module or the bundle(s) of the Integrated Trunk Module is reset. Exceptions are satellite delay, subrate multiplexing, security, encryption, group, alarm threshold, Link Framing Module slot/bundle, logical node translation, and node to translate, which take effect immediately. Most intermachine link parameters must be the same at both ends of the intermachine link, so changes made at one node usually require changes at another node.

- **DS-1/E-1 parameters—**Changes to DS-1/E-1 parameters are not implemented until the Integrated Trunk Module, Voice Processor, or Channelized Services Processor for that trunk is reset. Usually, the trunk is connected to a channel bank, PBX, digital cross-connect, or fractional service provider access point, so changes made at one Integrated Trunk Module, Voice Processor, or Channelized Services Processor do not require changes anywhere else in the network.

- **DS-0 and I/O channel parameters—**Channels should be disconnected before DS-0 and I/O channel parameters are changed. After parameter changes are made, the channels must be reconnected to implement the changes. Exceptions are the echo cancellation and transmission level point parameters for the Enhanced Voice Module, Foreign Exchange Station Module, and Foreign Exchange Office Module. Some channel parameters must be the same at both ends of the channel connection, so changes made at one node may require changes at another node.

- **Bundle configurations—**Changes to Channelized Services Processor and Integrated Trunk Module bundle configurations may require changes to the master DS-0 channel parameters and channel parameters at the terminator end of the connection. See Digital Voice and Channelized Services Parameters chapter and Integrated Trunk Parameters chapter in the Configuration Planning Manual for configuration guidelines.

- **Broadcast/polling connections—**Changes to master broadcast/polling channel connections require that the broadcast/polling group members, originator host channel, and master broadcast/polling channel are disconnected. After parameter changes are made, all channels must be reconnected to implement the changes.

- **Voice Server Module connections—**Changes to the speed parameter for channels processed by a Voice Server Module require that the channels be disconnected before the speed is changed. After the change is made, the channels must be reconnected to implement the change.

- **Link Framing Modules (Models LFM.3, .10, .11, .12, .14) —**Parameters and configuration do not take effect until the module is reset with the RST n:ss command.

- **D-Channel Module—**Parameters do not take effect until the module is reset with the RST n:ss command.

- **Voice profiles—**Changes to voice profiles do not affect associated channels until the channels are disconnected then reconnected.

- **Speed profiles—**Changes to speed profiles do not affect associated channels until the channels are disconnected then reconnected.

- Before making configuration changes, display parameters to verify current values and slot locations of channels.

- After making configuration changes, display parameters to verify that changes are correct. **Record changes on configuration worksheets.**

CONFIGURATION COMMANDS

Supervisory port configuration (programming) commands are described in the following paragraphs. Commands are in alphabetical order by command mnemonic. Related commands are discussed together.

Clear Master Clocking Node (CLR FMC, CLR MC, or CLR MM) Command

The CLR FMC, CLR MC, and CLR MM commands clear a node from being a master clocking node. Either command can be used.

Commands:

[NOD xxxx] CLR FMC
[NOD xxxx] CLR MC
[NOD xxxx] CLR MM

See "Define Master Clocking Nodes (DEF MM) Command" paragraph for information on defining a master clocking node.

Clear Remote Node Gateway (CLR GWY) Command

See "Set and Clear Remote Node Gateway (SET GWY, CLR GWY) Commands" paragraph.

Clear Master Clocking Node (CLR MC) Command

See "Clear Master Clocking Node (CLR FMC, CLR MC, or CLR MM) Command" paragraph.

Clear Master Clocking Node (CLR MM) Command

See "Clear Master Clocking Node (CLR FMC, CLR MC, or CLR MM) Command" paragraph.

Clear Broadcast/Polling Group Members (CLR POL) Command

See "Define and Clear Broadcast/Polling Group Members (DEF POL, CLR POL) Commands" paragraph.

Clear ABM Profile (CLR PRO) Command

See "Define and Clear ABM Profile (DEF PRO, CLR PRO) Commands" paragraph.

Clear Redundant Module (CLR RDN) Command

See "Set and Clear Redundant Module (SET RDN, CLR RDN) Commands" paragraph.

Clear Region (CLR REG) Command

The CLR REG command clears a node from regionalized routing. Nonregional routing requires that a route to every other node in the network be defined. This should be done prior to issuing the CLR REG command; otherwise, remote communication may be lost.

Command:

[NOD xxxx] CLR REG

Use the DSP SY command to determine if the node is defined as regionalized or nonregionalized.

Clear Routing Table (CLR RTE) Command

See "Define and Clear Routing Table (DEF RTE, CLR RTE) Commands" paragraph.

Clear Nodal Security (CLR SEC) Command

See "Set and Clear Nodal Security (SET SEC, CLR SEC) Commands" paragraph.

Clear Speed Profile (CLR SPR) Command

See "Define and Clear Speed Profile (DEF SPR, CLR SPR) Commands" paragraph.

Clear Voice Profile (CLR VPR) Command

See "Define and Clear Voice Profile (DEF VPR, CLR VPR) Commands" paragraph.

Convert Bias Routing (CNV BIAS) Command

The CNV BIAS command changes the bias routing for all channels that were bias routed on one intermachine link to another intermachine link.

Command:

[NOD xxxx] CNV BIAS ss_1[:cc_1] **{**ss_2[:cc_2] *or* OFF**}**

where:

ss_1[:cc_1]	=	current bias intermachine link slot number and bundle number (optional)
ss_2[:cc_2]	=	new bias intermachine link slot number and bundle number (optional)
OFF	=	terminate bias on intermachine link specified

For example, to change the routing for all channels currently bias routed over intermachine link 12 to intermachine link 11, enter:

```
CNV BIAS 12 11
```

NOTE: *Channels must be disconnected before the CNV BIAS command is issued. After the command is issued, the channels must be reconnected for the changes to take effect.*

Convert ABM Profile (CNV PRO) Command

The CNV PRO command converts the ABM profile of all channels and DS-0 channels using one ABM profile to another ABM profile.

Command:

[NOD xxxx] CNV PRO ppp_1 ppp_2

where:

ppp_1	=	"from" ABM profile (1-250 or D for default)
ppp_2	=	"to" ABM profile (1-250 or D for default)

For example, to convert all channels using the default ABM profile to ABM profile 1, enter:

```
CNV PRO D 1
```

Connect and Disconnect Channel (CON, CON BDL, CON CH, CON DS0, DSC, DSC BDL, DSC CH, DSC DS0) Commands

The CON command connects bundles, I/O channels, DS-0, X.50 DS-0, and X.50 subrate channels. The DSC command disconnects nonproprietary bundles, IO, DS-0, X.50 DS-0, and X.50 subrate channels. The CON BDL, DSC BDL, CON DS0, and DSC DS0 commands connect and disconnect DS-0 channels and bundled DS-0 channels when master DS-0 channel is specified.

PRECAUTION: ***The DSC * command disconnects all nonproprietary bundles, IO, DS-0, X.50 DS-0, and X.50 subrate channels. Use the DSC * command with extreme caution.***

NOTE: *If all channels or a range of channels are disconnected using the DSC CH command and then immediately reconnected using the CON CH command, one or more channels may fail to connect. If this should happen, repeat the CON CH command to successfully connect all of the channels.Commands:*

[NOD xxxx] CON *
[NOD xxxx] CON **{**n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**
[NOD xxxx] CON **{**n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}**
[NOD xxxx] CON BDL **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**[/Bz *or* /Xz]
[NOD xxxx] CON CH **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**
[NOD xxxx] CON DS0 **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**[/Bz *or* /Xz]
[NOD xxxx] DSC *[/F *or* /T]
[NOD xxxx] DSC **{**n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]]**}[/**T**]**
[NOD xxxx] DSC **{**n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]]**}[/**T**]**
[NOD xxxx] DSC BDL **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**[/F *or* /T]
[NOD xxxx] DSC CH **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/T]
[NOD xxxx] DSC DS0 **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**[/F *or* /T]

where:
- /B = specifies the use of the backup dial link directory associated with z, the Interlink Module slot or Integrated Trunk Module bundle number
- /F = disconnects the specified bundle and all channels on the bundle or disconnects the X.50 DS-0 channel and all associated X.50 subrate channels
- /X = specifies the use of the expansion dial link directory associated with z, the Interlink Module slot or Integrated Trunk Module bundle number
- /T = disconnects specified I/O channels, DS-0 channels, X.50 DS-0 channels, or X.50 subrate channels at the terminator end of a connection
- z = {1:ss, ss} for Interlink Module slots or {1:ss:cc, ss:cc} for Integrated Trunk Module bundle numbers

NOTE: *If the DSC CH command is issued with the /T modifier to a simplex terminator channel, the channel is temporarily disconnected and the connection is retried.*

Channels must be disconnected before certain programming changes are made. For example, the following commands require that the channels are disconnected before the command is issued, then reconnected to implement the changes:

- CNV BIAS—Changes bias routing for channel(s).
- DEF BIAS CH—Defines bias routing for I/O channel(s).

- DEF BIAS DS0—Defines bias routing for DS-0 channel(s).
- DEF CH/—Defines I/O channel parameters.
- DEF DS0—Defines Voice Processor DS-0 channel parameters.
- DEF DST CH or DEF CON—Defines I/O channel connections.
- DEF DST DS0 or DEF DST XS0—Defines DS-0 or X.50 DS-0 channel connections.
- DEF DST XCH—Defines X.50 subrate channel connections.
- DEF MDS0—Defines Channelized Services Processor master DS-0 channel parameters.
- DEF MSR POL—Defines the broadcast/polling master channel.
- DEF POL—Defines the specified channel to a broadcast/polling group with the specified master channel.
- DEF PSZ—Defines system maximum phasor size.
- DEF SPR—Defines the Isochronous Communication Module speed(s) for the specified profile number.
- DEF VPR—Defines the voice profile for the specified voice profile number.
- DEF XCH—Defines the X.50 subrate channel parameters for the X.50 Server Module.
- DEF XS0—Defines the X.50 DS-0 channel parameters for the X.50 Server Module.
- DEL CH—Deletes the database entries for the specified I/O channel(s), DS-0 channel(s), X.50 DS-0 channels, or X.50 subrate channels.
- SET BIAS XCH—Defines bias routing for X.50 subrate channel(s).
- SET BIAS XS0—Defines bias routing for X.50 DS-0 channel(s).
- SET CFG—Defines the bundle configuration for each Channelized Services Processor or Integrated Trunk Module.
- SET CH—Assigns the specified ABM profile to I/O or DS-0 channels within a specified range.
- SET MAP—Defines speed and timeslot for specified subrate channel (s) of the X.50 Server Module.

To implement the programming changes specified by these commands, the channel(s) must be disconnected and then connected as follows:

- If a channel is currently disconnected, issue the command to make programming changes. Then, enter the CON CH, CON DS0, or CON command to connect the channel and implement the changes.

- If a channel is currently connected, enter the DSC CH, DSC DS0, or DSC command to disconnect the channel. Issue the command to make programming changes. Then, enter the CON CH or CON DS0 command to connect the channel and implement the changes.

The connect channel command can be issued only at the originator end of a channel. Use the DSP CH, DSP MDS0, DSP DS0, or DSP XS0 command to determine which end of the channel is the originator.

The disconnect channel command can be issued at the originator or terminator end of a channel. Use the /T modifier to issue a disconnect channel command at the terminator end of a connection.

The following commands can also be used to connect or disconnect channels:

- CON DR—Direct channel connect.
- CON ND, DSC ND—Connect to node and disconnect from node.
- CON PR, DSC PR—Connect and disconnect channels by priority.
- CON PRO, DSC PRO—Connect and disconnect channels by ABM profile.
- DSC DL—Disconnect channels on intermachine link.

NOTE: *Contention channels with the proper control signals present will not respond to the DSC CH command.*

Connect Channel (CON CH) Command

See "Connect and Disconnect Channel (CON BDL, CON CH, CON DS0, DSC BDL, DSC CH, DSC DS0) Commands" paragraph.

Direct Channel Connect (CON DR) Command

The CON DR command allows the user to specify the route a particular channel connection will take to the destination node, overriding the paths defined in the routing tables.

Commands:

[NOD xxxx] CON DR **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]** p_1[,p_2,...p_8]**}**
[NOD xxxx] CON DR **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]** p_1[,p_2,...p_8][/B *or* /X]**}**
[NOD xxxx] CON DR **{*** *or* n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]** p_1[,p_2,...p_8]**}**

where: n:ss:c = I/O channel to be routed
n:ss:cc = DS-0 or X.50 DS-0 channel to be routed
n:ss:cc:sr = X.50 subrate channel to be routed
p_1 = a path number (1-8) listed in the routing table of the originating node. This path is used to connect the channel to the next node in the route to the destination node.
p_2,...p_8 = a path number (1-8) listed in the routing table of each subsequent bypass node. Each path is used to connect the channel to the next node in the route to the

destination node. Up to seven bypass nodes between the originating node and the destination node are allowed.

/B = overrides the first path number and specifies the corresponding backup bundle instead

/X = overrides the first path number and specifies the corresponding expansion bundle instead

NOTE: *The CON DR command is not supported for Isochronous Communication Module I/O channels.*

See Figure 6-1 for an example of the CON DR command.

If a routed channel encounters an intermachine link operating in simplex mode, the channel may not be routed according to the specified path.

The route established by the CON DR command is NOT stored in the database and will be lost if the specified channel is subsequently disconnected and connected.

The CON DR command can be implemented only at the originator end of a channel. Use the DSP CH, DSP MDS0, or DSP DS0 command to determine which end of the channel is the originator.

For diagnostic purposes, CON DR connections can be made over an intermachine link that is in loopback.

NOTE: *If the CON DR command is issued to a channel while a previous CON DR command is still being processed, the message "CONNECT QUEUE IN USE" is displayed.*

Connect DS-0 Channel (CON DS0) Command

See "Connect and Disconnect Channel (CON BDL, CON CH, CON DS0, DSC BDL, DSC CH, DSC DS0) Commands" paragraph.

Connect to Node and Disconnect from Node (CON ND, DSC ND) Commands

The CON ND command connects channels to the specified node(s). The DSC ND command disconnects channels from the specified node(s). Both commands can be restricted to connect or disconnect channels having the specified priority level.

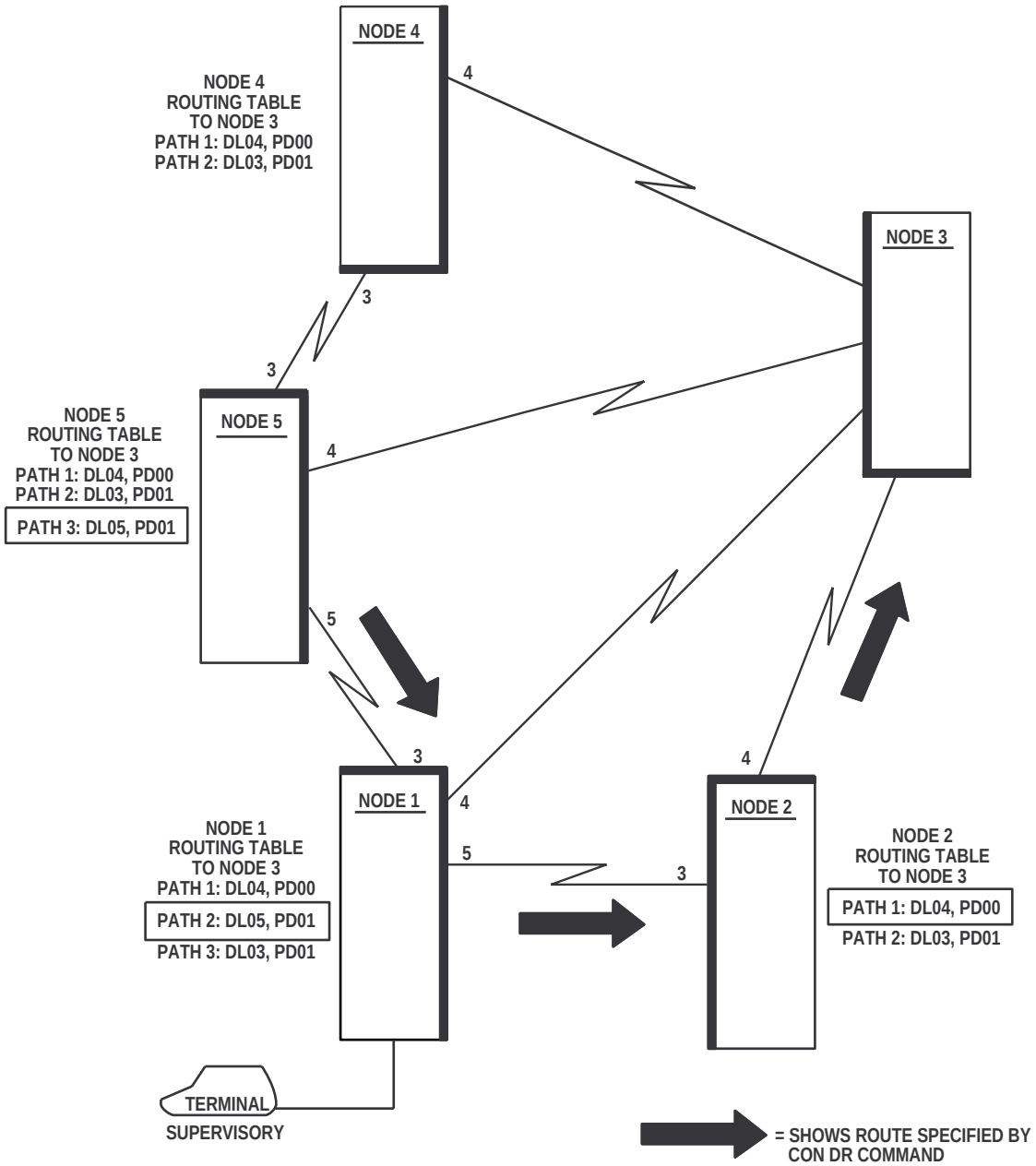
Commands:

[NOD xxxx] CON ND **{*** *or* xxxx[-xxxx]...**[**,xxxx[-xxxx]**]}**[/Ppr]
[NOD xxxx] DSC ND **{*** *or* xxxx[-xxxx]...**[**,xxxx[-xxxx]**]}**[/Ppr]

where: /Ppr = connects or disconnects channels with connect priority level pr (1-16) only

For example, to connect all channels originating at node 15 and terminating at nodes 20 and 21, enter:

```
NOD 15 CON ND 20,21
```



COMMAND ENTERED AT SUPERVISORY TERMINAL LOCATED AT NODE 1:

NOD 5 CON DR n:ss:c 3,2,1

CONNECTION USES:

- PATH 3 FROM NODE 5 TO NODE 1
- PATH 2 FROM NODE 1 TO NODE 2
- PATH 1 FROM NODE 2 TO NODE 3

Figure 6-1. Example of Direct Channel Connect (CON DR) Command

To restrict the connections to only those channels having a priority of 3, enter:

```
NOD 15 CON ND 20,21/P3
```

To disconnect all channels originating at node 15 and terminating at nodes 20 and 21, enter:

```
NOD 15 DSC ND 20,21
```

The CON ND and DSC ND commands can be implemented only at the originator end of a channel. Use the DSP CH, DSP MDS0, or DSP DS0 command to determine which end of the channel is the originator.

Connect and Disconnect Broadcast/Polling Group Members (CON POL, DSC POL) Commands

The CON POL command connects the specified channel to the defined broadcast/polling group. The DSC POL command disconnects the specified channel from the defined broadcast/polling group.

The specified channel will be connected if the following requirements are met:

- The associated Quad Synchronous Processor is installed and the INS command was issued for the module.
- The master channel and the broadcast/polling channel are in the same nest.
- A previous connection for the channel does not exist.
- The channel is defined to a broadcast/polling group.
- The master channel is connected.

Commands:

[NOD xxxx]CON POL **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/A]
[NOD xxxx]DSC POL **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/A]

where: /A = connects or disconnects all broadcast/polling group members associated with the specified master channel

NOTE: *The DSC POL command will not disconnect the master broadcast/polling channel(s). To disconnect the master broadcast/polling channel(s), each corresponding originator host channel must be disconnected using the DSC CH command.*

For example, to connect broadcast/polling group member 1:18:3, enter:

```
CON POL 1:18:3
```

To connect all the broadcast/polling group members associated with master channel 1:18:1, enter:

```
CON POL 1:18:1/A
```

To disconnect broadcast/polling group member 1:18:3, enter:

```
DSC POL 1:18:3
```

To disconnect all the broadcast/polling group members associated with master channel 1:18:1, enter:

```
DSC POL 1:18:1/A
```

Connect and Disconnect Channels by Priority (CON PR, DSC PR) Commands

The CON PR command connects channels with the specified priority level(s). The DSC PR command disconnects channels with the specified priority level(s). Both commands can be restricted to connect or disconnect channels terminating at a specified node.

Commands:

[NOD xxxx]CON PR **{*** *or* pr[-pr]...**[**,pr[-pr]**]}**[/Nxxxx]
[NOD xxxx]DSC PR **{*** *or* pr[-pr]...**[**,pr[-pr]**]}**[/Nxxxx]

where: pr = connect priority level (1-16)
/Nxxxx = connects or disconnects channels terminating at node xxxx only

For example, to connect all channels originating at node 30 having priorities of 3 and 4, enter:

```
NOD 30 CON PR 3,4
```

To restrict the connections to only those channels terminating at node 20, enter:

```
NOD 30 CON PR 3,4/N20
```

To disconnect all channels originating at node 30 having priorities of 3 and 4, enter:

```
NOD 30 DSC PR 3,4
```

The CON PR and DSC PR commands can be implemented only at the originator end of a channel. Use the DSP CH, DSP MDS0, DSP DS0, DSP XS0 command to determine which end of the channel is the originator.

Connect and Disconnect Channels by ABM Profile (CON PRO, DSC PRO) Commands

The CON PRO command connects all channels that have been assigned to the specified ABM profile(s). The DSC PRO command disconnects all channels that have been assigned to the specified ABM profile(s).

Commands:

[NOD xxxx] CON PRO ppp[-ppp]...**[**,ppp[-ppp]**]** [/D]
[NOD xxxx] CON PRO /D

[NOD xxxx] DSC PRO ppp[-ppp]...**[**,ppp[-ppp]**]** [/D]
[NOD xxxx] DSC PRO /D

where: ppp = ABM profile (1-250)
/D = qualifier to include default ABM profile in the range

NOTE: *The DSC PRO command does not affect bandwidth contention channels.*

For example, to connect all channels using the default ABM profile, enter:

CON PRO/D

To disconnect all channels using ABM profiles 1, 5, and the default ABM profile, enter:

DSC PRO 1,5/D

Define Alarm Notification List (DEF ALM) Command

The DEF ALM command defines the alarm notification list for a node. The alarm notification list specifies the remote node(s) that the local node must notify when an alarm occurs. An alarm message is automatically displayed on an idle supervisory terminal at the specified remote node(s) when an alarm occurs (providing the SET MUM REM command has not been implemented) and is logged in the alarm table.

The alarm notification list also specifies the remote nodes that can issue nonglobal gateway commands to the local node.

Command:

[NOD xxxx] DEF ALM

NOTE: *When the remote command is used, the local node should be placed on the alarm notification list to ensure that subsequent gateway commands are accepted.*

After the command is entered, the supervisory port prompts the user to enter node numbers, Figure 6-2. Up to 16 node numbers can be entered on the alarm notification list. Press the RETURN key at a blank entry to terminate the list. If a Control C character is entered when defining a node's alarm notification list from a remote node, no entry is made on the list. If a Control C character is entered when defining a node's alarm notification list locally, the last node entered is not saved to the list.

```
N0001>DEF ALM

ALARM 01:148
ALARM 02:253
ALARM 03:1330
ALARM 04:
```

ALARM 01 - Alarm notification list numbers (1-16) **148 -** User-entered node number

Figure 6-2. Typical Define Alarm Notification List (DEF ALM) Command

Define Integrated Trunk Module Bundle Parameters (DEF BDL NPR, DEF BDL PR) Commands

The DEF BDL NPR and DEF BDL PR commands display the current Integrated Trunk Module bundle configuration parameters and allow the user to change parameter values in the database for the specified Integrated Trunk Module. The DEF BDL NPR command displays the current nonproprietary bundle parameters; the DEF BDL PR command displays the current proprietary bundle parameters. The commands are always issued to the master DS-0 of any bundle.

Commands:

[NOD xxxx] DEF BDL NPR **{*** *or* 1:ss:cc[-1:ss:cc]...**[**,1:ss:cc[-1:ss:cc]**]}**
[NOD xxxx] DEF BDL PR **{*** *or* 1:ss:cc[-1:ss:cc]...**[**,1:ss:cc[-1:ss:cc]**]}**

After the command is entered, the supervisory port displays the current nonproprietary, Figure 6-3A, or proprietary, Figure 6-3B, bundle parameters for the specified Integrated Trunk Module. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the Integrated Trunk Parameters chapter in the Configuration Planning Manual for parameter values.

If more than one channel or a range of channels is entered in the command, the supervisory port displays the parameters of the first channel specified. After the new parameter values have been entered, the parameters of all specified channels will be overwritten with the bundle parameter values that are displayed.

NOTE: *Channels must be disconnected before the DEF BDL NPR command is issued. After the command is issued, the bundle must be reconnected for the changes to take effect.*

Channels should be disconnected before the DEF BDL PR command is issued. After the command is issued, reset the bundle with the RST BDL command to effect the changes. The channels must then be reconnected.

If a DS-0 channel is connected when a ***remote*** *DEF BDL NPR command is issued, the command is aborted and the message "CONNECTION EXISTS, CMD ABORTED" is displayed.*

If a DS-0 channel within a range is connected, execution of a ***local*** *DEF BDL NPR command will update only the disconnected channel parameters.*

The Integrated Trunk Module proprietary bundle uses only frame mode 2.

```
N0077>DEF BDL NPR 1:10:01
CONNECT   PROFILE   VPROFILE  PRIORITY  DELAYTHR  TX MODE   SIGNAL
ORIG        32      NONE      01        02        Nx64K CC  NONE

A OOS     B OOS     C  D OOS  OOS BITS  DSC ALM
                              7F        ENABLE
```

CONNECT - Originator/terminator of connection
PROFILE - ABM profile
VPROFILE - Voice profile
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
TX MODE - Transport mode of operation
SIGNAL - Signaling mode

A OOS - Out-of-service operation for A signaling
B OOS - Out-of-service operation for B signaling
C D OOS - Out-of-service operation for C and D signaling
OOS BITS - Out-of-service bit pattern
DSC ALM - Disable/enable alarm

A. NONPROPRIETARY BUNDLE PARAMETERS (DEF BDL NPR)

```
N0077>DEF BDL PR 1:10:15
CONNECT   ARQ       SYNCS     TX MODE   SECURITY  ENCRYPT
PR-ORIG   200       08,LVL2   NxSW56K   DISABLE   NO

BDL TYPE  GROOMING  POWERUP   LINKBACK  LINK EXP
DIAL LNK  DISABLE   AUTO CON  1:12:1    1:14:06

GROUP     ALMTHLD   AL7MASK   UNIT
-------   DONT CARE ON        MASTER
```

CONNECT - Proprietary originator/terminator of connection
ARQ - Supervisory channel bandwidth (BPS)
SYNCS - Number of sync characters per scan cycle, sync level
TX MODE - Transport mode of operation
SECURITY - Security
ENCRYPT - Encryption
BDL TYPE - Bundle type

GROOMING - Grooming
POWERUP - Automatic connect at powerup
LINKBACK - Link backup bundle
LINK EXP - Link expansion bundle
GROUP - Group assignment
ALMTHLD - Alarm threshold
AL7MASK - Alarm 7 masking
UNIT - Master/Slave designation

B. PROPRIETARY BUNDLE PARAMETERS (DEF BDL PR)

Figure 6-3. Typical Define Integrated Trunk Module Bundle Parameters Commands

Define Bias Routing (DEF BIAS CH, DEF BIAS DS0) Commands

The DEF BIAS CH and DEF BIAS DS0 commands define the bias route (first intermachine link) over which a channel will be connected to a remote node. The DEF BIAS CH command defines the bias routing for I/O channels. The DEF BIAS DS0 command defines bias routing for Voice Processor, Channelized Services Processor, and Integrated Trunk Module DS-0 channels or bundled DS-0 channels.

NOTE: *To define bias routing for X.50 DS-0 channels, use the SET BIAS XS0 command.*

Commands:

[NOD xxxx] DEF BIAS CH n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]**/*routing*
[NOD xxxx] DEF BIAS DS0 n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]**/*routing*

where *routing* is one of the following:

Lss[:cc]	=	the intermachine link number and bundle number (optional) to which all channels in the specified range of channels will bias
Lss[:cc]/O	=	only the odd-numbered channels within the specified range of channel numbers will bias to the intermachine link and bundle number (optional) specified in the command
Lss[:cc]/E	=	only the even-numbered channels within the specified range of channel numbers will bias to the intermachine link and bundle number (optional) specified in the command
OFF	=	the specified channels will terminate bias routing
OFF/O	=	only the odd-numbered channels within the specified range of channel numbers will terminate bias routing
OFF/E	=	only the even-numbered channels within the specified range of channel numbers will terminate bias routing

If the intermachine link specified in the command is out-of-service, then the next intermachine link in the routing table is selected. Every intermachine link in the routing table is attempted before the biased intermachine link is retried. The channel is not placed on the retry queue until every intermachine link in the routing table is tried once.

If the intermachine link selected in the command is not defined or is not listed in the routing table to the destination node, then the LINK/2+ System will attempt connection over the primary, nonbiased route.

Some applications of bias routing include the following:

- **An alternative to the CON DR command:** The route defined with the DEF BIAS command remains in the database, while the route defined using the CON DR command will be lost if the channel is subsequently disconnected and reconnected.
- **Channel redundancy:** Route two channels with the same destination over two different intermachine links.
- **Route avoidance:** Bias route to ensure that less desirable routes are taken only as a last resort.

- **Load sharing:** Bias routing can be used to distribute channels over several intermachine links. Without bias routing, the primary route is always the first one attempted.

NOTE: *The bias routing parameters are defined for originator channels only.*

Channels must be disconnected before the DEF BIAS CH and DEF BIAS DS0 commands are issued. After the commands are issued, the channels must be reconnected for the changes to take effect.

Define System Clock Fallback List (DEF CFB) Commands

The DEF CFB commands define the system clock fallback list, which specifies the primary system clock source and two fallback clock sources.

Commands:

[NOD xxxx] DEF CFB 1 *clock*
[NOD xxxx] DEF CFB 2 *clock*
[NOD xxxx] DEF CFB 3 *clock*

Define the three system clock sources by entering each of the following commands:

DEF CFB 1 *clock* - Clock fallback 1 (primary) source

DEF CFB 2 *clock* - Clock fallback 2 source

DEF CFB 3 *clock* - Clock fallback 3 source

All three commands must be entered. See System Parameters chapter in the Configuration Planning Manual for guidelines on clock source selection. The choices for the *clock* parameter are:

CH 1:ss:c	=	synchronous channel receive clock
DLR ss	=	intermachine link receive clock
DLT ss	=	intermachine link transmit clock
DRI ss	=	intermachine link independent receive clock
DS1 n:ss	=	DS-1 trunk clock
DS1 n:ss/SC1	=	DS-1 trunk clock with Voice Processor output to Network Module station clock 1
DS1 n:ss/SC2	=	DS-1 trunk clock with Voice Processor output to Network Module station clock 2
INT	=	internal 6 MHz oscillator
LFM n:ss	=	NTT High-Speed Secondary Service trunk clock (from LFM.14 Module)
LFM n:ss/SC1	=	NTT High-Speed Secondary Service trunk clock with LFM.14 Module output to Network Module station clock 1
LFM n:ss/SC2	=	NTT High-Speed Secondary Service trunk clock with LFM.14 Module output to Network Module station clock 2
SC1	=	Network Module station clock 1 input
SC2	=	Network Module station clock 2 input
SKP	=	skip clock source (indicates that this clock fallback entry does not have a clock source and is not checked when a clock failure occurs)

NOTE: *Up to two SKP clock fallback entries are allowed. At least one clock fallback entry must specify a clock source.*

If all system clock sources are incorrectly defined, e.g., slot number specified for DLR or DLT clock is not an Interlink Module, the internal clock is used as the system clock.

Some typical clocking arrangements are as follows:

- Clock fallback 1, 2, and 3 are all independent clock sources. If clock fallback 1 (primary) fails, clock fallback 2 is automatically used as the system clock. If clock fallback 2 fails, clock fallback 3 is automatically used as the system clock. If clock fallback 3 fails, the LINK/2+ System will attempt to use the original primary clock fallback 1 source. If all clocks on the fallback list fail, the internal clock is used until one of the clocks on the fallback list becomes functional.

- Clock fallback 1 and 2 are independent clock sources, and clock fallback 3 is a SKP clock source entry. If clock fallback 1 (primary) fails, clock fallback 2 is automatically used as the system clock. If clock fallback 2 fails, the LINK/2+ System will attempt to use the original primary clock fallback 1 source. If all clocks on the fallback list fail, the internal clock is used until one of the clocks on the fallback list becomes functional.

- Clock fallback 3 is an independent clock source and clock fallback 2 is a dependent clock source. When clock fallback 1 (primary) fails, clock fallback 3 is automatically used as the system clock source; the LINK/2+ System will attempt to use an independent clock source before a dependent clock source. If clock fallback 3 fails, clock fallback 2 is automatically used as the system clock. If clock fallback 2 fails, the LINK/2+ System will attempt to use the original primary clock fallback 1 source. If all clocks on the fallback list fail, the internal clock is used until one of the clocks on the fallback list becomes functional.

The following restrictions apply to system clock sources:

- If the internal clock is on the clock fallback list, automatic fallback to the next clock source is inhibited. Use the SET CLK command to direct the LINK/2+ System to use another clock source as the system clock.

- If a synchronous channel receive clock is a system clock source, enter n:ss:c to specify the channel. Only channels in the Control Mainframe (nest 1) can be used. The specified channel must be defined as a DTE with an external clock. The channel speed should be at least 2400 bps and must be a multiple of 400 Hz.

- If an intermachine link receive clock (DLR or DRI) or intermachine link transmit clock (DLT) is a system clock source, enter slot number ss to specify the location of the Interlink Module for that intermachine link.

- If Network Module station clock 1 or station clock 2 is a system clock source, define the station clock speed with the DEF SC command before entering SC1 or SC2 on the clock fallback list.

- If a DS-1 trunk clock (DS1) is a system clock source, enter nest and slot number n:ss to specify the location of the Voice Processor, Integrated Trunk Module, or Channelized Services Processor for that DS-1 trunk. If the Voice Processor is in an Expander Mainframe, the DS-1 clock must be externally input to the Network Module via station clock 1 (/SC1) or station clock 2 (/SC2).

- If an Integrated Trunk Module is selected as a clock fallback, the only valid choice for the *clock* parameter is DS1 n:ss.

Define Channel Parameters (DEF CH/, DEF DS0, DEF MDS0) Commands

The DEF CH/, DEF DS0, and DEF MDS0 commands display the current channel parameters for the specified channel(s) and module type, and allow the user to change parameter values in the database. Use the DEF CH/ command for I/O module channels. Use the DEF DS0 command for Voice Processor DS-0 channels. Use the DEF MDS0 command for Channelized Services Processor master DS-0 channels.

Commands:

[NOD xxxx] DEF CH/*module* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]**

where:

DCI	=	Dual Isochronous Module
DSC	=	Dual Synchronous Module
EVM	=	Enhanced Voice Module
FXO	=	Foreign Exchange Office Module
FXS	=	Foreign Exchange Station Module
ICM	=	Isochronous Communication Module
QAM	=	Quad Asynchronous Module
QSC	=	Quad Synchronous Module, QVC Voice Module, or Subrate Channel Processor
QSP	=	Quad Synchronous Processor
QVM	=	QVM Voice Module
QVM.1	=	QVM.1 Voice Module
QVM.2	=	QVM.2 Voice Module
QVM.3	=	QVM.3 Voice Module
QVM.5	=	QVM.5 Voice Module
QVM.6	=	QVM.6 Voice Module

NOTE: *Channel parameters for an entréeLINK+ FXO.3 Foreign Exchange Office Module cannot be configured from a LINK/2+ node. This module must be configured via the supervisory port of an entréeLINK+ node or from a TIME/VIEW Network Management System.*

[NOD xxxx] DEF DS0 n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]**

[NOD xxxx] DEF MDS0 1:ss:cc[-1:ss:cc]...**[**,1:ss:cc[-1:ss:cc]**]**

After the DEF CH/, DEF DS0, or DEF MDS0 command is entered, the supervisory port displays the current channel parameters, Figure 6-4, for the specified channel. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the chapters on defining channel parameters in the Configuration Planning Manual for parameter values.

If more than one channel or a range of channels is entered in the command, the supervisory port displays the parameters of the first channel specified. After the new parameter values have been entered, the parameters of all specified channels will be overwritten with the parameter values that are displayed, provided these channels are on the same module type as the displayed channel.

NOTE: *Channels must be disconnected before the DEF CH/, DEF DS0, and DEF MDS0 commands are issued. After the commands are issued, the channels must be reconnected for the changes to take effect.*

*If a DS-0 channel is connected when a **local or remote** DEF DS0 or DEF MDS0 command is issued, the command is aborted and the message "CONNECTION EXISTS, CMD ABORTED" is displayed.*

*If a DS-0 channel within a range is connected, execution of a **local or remote** DEF DS0 or DEF MDS0 command will update only the disconnected channel parameters.*

```
N0001>DEF CH/QSC 1:6:1
SPEED      PROFILE    PRIORITY   DELAYTHR   CONNECT    FNS.
9600       * 5        16         07         ORIG       OUTBAND

TYPE       PHRESET    PHASOR     OOS OPER   CTSGEN     CTSDELAY
DCE                   MX         DO NOTHING AUTO       28

CTN.TYPE   B/W.FNS.
OFF
```

Parameters are changed via menu selection:

SPEED - Data speed. Only speeds supported by the type of Network Module installed are displayed as menu selections.
PROFILE - ABM profile (When preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
CONNECT - Originator/terminator of connection
FNS - Mode of transmitting EIA functions
TYPE - Interface type
PHRESET - Receive phasor reset (inband DTE only)
PHASOR - Phasor size
OOS OPER - Out-of-service operation
CTSGEN - CTS generation (DCE only)
CTSDELAY - CTS delay (AUTO CTSGEN only)
CTN. TYPE - Contention type
B/W. FNS. - Bandwidth functions

NOTE: See DSP CH or DSP DS0 command examples in Chapter 5 for other types of channel parameter displays.

A. QUAD SYNCHRONOUS MODULE CHANNELS (DEF CH/)

Figure 6-4. Typical Define Channel Parameters Commands (Sheet 1 of 6)

NOTE: *When defining Quad Synchronous Processor channels at a local node, a "g" will appear to the right of the speed value if the speed is not supported by the Network Module type installed. The speed is recognized by the LINK/2+ System, but external clocking is required (i.e., TYPE = DTE2) for other than QSP.12, QSP.14, or QSP.18 Quad Synchronous Processor Modules.*

When defining a remote Quad Syncronous Processor channel, the "g" will not be displayed. In this case, use the DSP CH command to determine if the speed is a "g" type.

```
N0001>DEF CH/ICM 1:3:2
CONNECT    MODE       TYPE       SPD.PROF   OOS OPER   PHASOR
ORIG       PLEIS      DTE1       DISABLE    MARK FF    10

SPEED      PROFILE    PRIORITY   DELAYTHR   POLARITY   MIL.INT.
1544000    DEFAULT    01         02         D-N,F-N    D-B,F-B

CTN.TYPE   B/W.FNS.   CTSGEN     CTSDELAY   MX.ADJST   BYTE CNT
OFF                                         1          1

DSR/DTR    ERR.POL.   MX.STUFF
TRNS       NORMAL     04
```

Parameters are changed via menu selection:

CONNECT - Originator/terminator of connection
MODE - Mode of operation
TYPE - Interface type
SPD.PROF - Speed profile (ENABLE/DISABLE)
OOS OPER - Out-of-service operation
PHASOR - Phasor size (bytes)
SPEED - Channel speed (bps)◊
PROFILE - ABM profile
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
POLARITY - Polarity, where:
- **D-N,F-N** = data normal, functions normal
- **D-I,F-N** = data inverted, functions normal
- **D-N,F-I** = data normal, functions inverted
- **D-I,F-I =** data inverted, functions inverted

MIL.INT. - Military switchable interface, where:
- **D-B, F-B =** data balanced, functions balanced
- **D-U, F-B =** data unbalanced, functions balanced
- **D-B, F-U =** data balanced, functions unbalanced
- **D-U, F-U =** data unbalanced, functions unbalanced

CTN.TYPE - Contention type
B/W. FNS. - Bandwidth functions
CTSGEN - Clear-to-send generation
CTSDELAY - Clear-to-send delay time in milliseconds
MX.ADJST - Maximum output clock adjustment
BYTE CNT - Byte counter
DSR/DTR - Data set ready/data terminal ready control
ERR.POL. - Error polarity
MX.STUFF - Maximum stuffer error correction

◊ = When speed profile is enabled, speed profile number is displayed.

B. ISOCHRONOUS COMMMUNICATION MODULE CHANNELS (DEF CH/)

Figure 6-4. Typical Define Channel Parameters Commands (Sheet 2)

```
N0010>DEF CH/EVM 2:1:1
CONNECT    PROFILE    VPROFILE   SPEED      PRIORITY   DELAYTHR
ORIG         2        NONE       16000      01         06

PHASOR     CODE.LAW   1S.DNSTY   E-LD FTR   OOS OPER
8                     OFF        0          FORCE IDLE

ECH CANL   ECH TAIL   CEN CLIP   TONE DSB   SF SIG
ENABLE     16 MS      ENABLE     ON         NONE

  TX TLP   IN DBM       RX TLP   IN DBM     FAX NSF
       -18 .0                -18 .0         DISABLE
```

Parameters are changed via menu selection:

CONNECT - Originator/terminator of connection
PROFILE - ABM profile (When preceded by *, profile is undefined)
VPROFILE - Voice profile (When preceded by *, profile is undefined)
SPEED - Channel speed §
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
PHASOR - Phasor size (bytes)
CODE.LAW - Code law
1S. DNSTY - Ones density
E-LD FTR - E-lead filter
OOS OPER - Out-of-service operation
ECH CANL - Echo canceler §
ECH TAIL - Echo tail length §
CEN CLIP - Center clipper §
TONE DSB -Tone disable §
SF SIG - Single frequency signaling §
TX TLP IN DBM - Transmit transmission level point in dBm
RX TLP IN DBM - Receive transmission level point in dBm
FAX NSF - Fax nonstandard functions (EVM.3 only)

§ = If a voice profile is selected, these parameters are not individually programmed.

C. ENHANCED VOICE MODULE CHANNELS (DEF CH/)

Figure 6-4. Typical Define Channel Parameters Commands (Sheet 3)

```
N0010>DEF CH/FXO 1:7:1 - 1:7:4
CONNECT    PROFILE    VPROFILE    SPEED      PRIORITY   DELAYTHR
ORIG         1        NONE        8000       02         07

PHASOR     CODE.LAW   1S.DNSTY   A/B FLTR   OOS OPER
8          MU-LAW     ON                    FORCE IDLE

ECH CANL   ECH TAIL   CEN CLIP   TONE DSB   SF SIG
ENABLE     32 MS      ENABLE     ON         NONE

  TX TLP   IN DBM       RX TLP   IN DBM     FAX NSF
       -10 .0                -10 .0         ENABLE
```

Parameters are changed via menu selection:

CONNECT - Originator/terminator of connection
PROFILE - ABM profile (When preceded by *, profile is undefined)
VPROFILE - Voice profile (When preceded by *, profile is undefined)
SPEED - Channel speed §
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
PHASOR - Phasor size (bytes)
CODE.LAW - Code law
1S. DNSTY - Ones density
A/B FLTR - A/B filter
OOS OPER - Out-of-service operation
ECH CANL - Echo canceler §
ECH TAIL - Echo tail length §
CEN CLIP - Center clipper §
TONE DSB -Tone disable §
SF SIG - Single frequency signaling
TX TLP IN DBM - Transmit transmission level point in dBm
RX TLP IN DBM - Receive transmission level point in dBm
FAX NSF - Nonstandard fax features◊

§ = If a voice profile is selected, these parameters are not individually programmed.
◊ = FXO.3 and FXS.3 Modules only.

D. FOREIGN EXCHANGE MODULE CHANNELS (DEF CH/)

Figure 6-4. Typical Define Channel Parameters Commands (Sheet 4)

```
N0001>DEF DS0 1:9:1
CONNECT   PROFILE   VPROFILE  PRIORITY  DELAYTHR  TX MODE   SIGNAL
ORIG      *  2        1       03        01                  A

A OOS     B OOS     C  D OOS  ABCD IDL  OOS BITS  DSC ALM   BUSYOUT
MARK      SPACE     SP SP

PHASOR
08
```

Parameters are changed via menu selection:

CONNECT - Originator/terminator/contention
PROFILE - ABM profile (When preceded by *, profile is undefined)
VPROFILE - Voice profile (When preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
TX MODE - Transport mode of operation
SIGNAL - Signaling mode
A OOS - Out-of-service operation for A signaling
B OOS - Out-of-service operation for B signaling
C D OOS - Out-of-service operation for C and D signaling, where:
SP = space
MK = mark
ABCD IDL - ABCD idle bit pattern
OOS BITS - Out-of-service bit pattern
DSC ALM - Disable/enable alarm
BUSYOUT - Busy out timer
PHASOR - Phasor size (bytes)

E. VOICE PROCESSOR DS-0 CHANNELS (DEF DS0)

```
N0001>DEF MDS0 1:9:1
CONNECT   PROFILE   PRIORITY    DELAYTHR  TX MODE   SIGNAL
ORIG      2         03          01        MU-PCM    AB

A OOS     B OOS     C  D OOS    OOS BITS  DSC ALM
SPACE     SPACE     SP SP
```

Parameters are changed via menu selection:

CONNECT - Originator/terminator of connection
PROFILE - ABM profile (When preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
TX MODE - Transport mode of operation
SIGNAL - Signaling mode
A OOS - Out-of-service operation for A signaling
B OOS - Out-of-service operation for B signaling
C D OOS - Out-of-service operation for C and D signaling, where:
SP = space
MK = mark
OOS BITS - Out-of-service bit pattern
DSC ALM - Disable/enable alarm

F. CHANNELIZED SERVICES PROCESSOR DS-0 CHANNELS (DEF MDS0)

Figure 6-4. Typical Define Channel Parameters Commands (Sheet 5)

```
N0001>DEF CH/QSP 2:12:3
CONNECT    SPEED      OUTPUT     PROFILE    PRIORITY   DELAYTHR
ORIG       56000      =IN SPD    DEFAULT    02         02


TYPE       FNS.       PHRESET    PHASOR     CTSGEN     CTSDELAY
DCE        INBAND                MX         TRANS


CTN.TYPE   B/W.FNS.   OOS OPER   DTR.FUNC   MIL.INT.   POLARITY
OFF                   MARK FF    TRNS       D-U,F-U    D-N,F-N


SPECIAL    STR.TMR.   DSR.OPT.   SW56_SIG
56K/64K               TRNS       ENABLE
```

Parameters are changed via menu selection:

CONNECT - Originator/terminator of connection

SPEED - Channel speed (bps)

OUTPUT - Output mode or transmit speed

PROFILE - ABM profile (When preceded by *, profile is undefined)

PRIORITY - Connect priority level

DELAYTHR - Delay threshold

TYPE - Interface type

FNS. - Mode of transmitting EIA functions

PHRESET - Receive phasor reset (DTE, in-band only)

PHASOR - Phasor size

CTSGEN - Clear-to-send generation (DCE only)

CTSDELAY - Clear-to-send delay time in milliseconds (DCE, AUTO CTSGEN only)

CTN. TYPE - Contention type

B/W. FNS. - Bandwidth functions

OOS OPER - Out-of-service operation

DTR.FUNC - Data terminal ready signal

MIL.INT. - Military switchable interface, where:

- **D-B, F-B =** data balanced, functions balanced
- **D-U, F-B =** data unbalanced, functions balanced
- **D-B, F-U =** data balanced, functions unbalanced
- **D-U, F-U =** data unbalanced, functions unbalanced

POLARITY - Polarity, where:

- **D-N,F-N =** data normal, functions normal
- **D-I,F-N =** data inverted, functions normal
- **D-N,F-I =** data normal, functions inverted

SPECIAL - Special features, where:

- **NONE =** No special features selected
- **LPDA-1 =** Link Problem Diagnostic Aid
- **56K/64K =** 56K service
- **BCAST/D =** Broadcast/polling, data sensitivity
- **BCAST/D/SP =** Broadcast/polling, data sensitivity, spacing alarm
- **BCAST/F =** Broadcast/polling, function sensitivity
- **BCAST/F/SP =** Broadcast/polling, function sensitivity, spacing alarm
- **SMPLX BCST =** Simplex broadcast mode

STR. TMR. - Anti-streaming timer, where:

- **OFF =** No anti-streaming timer
- **1-30 or 64 =** 1 to 30 seconds or 64 seconds

DSR. OPT. - Data set ready option

SW56_SIG - Switched 56K service with end-to-end signaling when enabled. Switched 56K service without end-to-end signaling when disabled.

G. QUAD SYNCHRONOUS PROCESSOR MODULE CHANNELS (DEF QSP)

Figure 6-4. Typical Define Channel Parameters Commands (Sheet 6)

Define Channel Connection (DEF CON) Command

The DEF CON command defines channel connections from an I/O channel to another I/O channel, a DS-0 channel, or an X.50 subrate channel. The DEF CON command is the same as the DEF DST CH command. See "Define Destination Channel (DEF DST CH, DEF DST DS0, DEF DST XS0) Commands" paragraph.

Command:

[NOD xxxx] DEF CON n_L:ss_L:c_L[-n_L:ss_L:c_L]/Nxxxx **{**Cn_D:ss_D:c_D[-n_D:ss_D:c_D]
or Dn_D:ss_D:cc_D[-n_D:ss_D:cc_D] *or* Xn_D:ss_D:cc_D:sr_D[-n_D:ss_D:cc_D:sr_D]**}**

where:

n_L:ss_L:c_L	=	specifies local I/O channel
/Nxxxx	=	specifies node number of destination channel. Destination channel must be at a remote node for I/O channel to I/O channel connections.
Cn_D:ss_D:c_D	=	specifies destination I/O channel
Dn_D:ss_D:cc_D	=	specifies destination DS-0 channel
Xn_D:ss_D:c_D:sr_D	=	specifies destination X.50 subrate channel

NOTE: *A channel must be defined before establishing a connection. Otherwise, the message "UNDEFINED CHANNEL" is displayed.*

Define Supervisory Computer Port Parameters (DEF CP) Command

The DEF CP command displays the current supervisory computer port parameters and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF CP

After the command is entered, the supervisory port displays the current parameters, Figure 6-5. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the System Parameters chapter of the Configuration Planning Manual for parameter values.

```
N0001>DEF CP
SPEED        STOP         PARITY
9600         01           NONE
```

SPEED - Computer port speed (bps)
STOP - Number of stop bits
PARITY - Parity type

Figure 6-5. Typical Define Supervisory Computer Port Parameters (DEF CP) Command

Define Channelized Services Processor DS-1 Parameters (DEF CSP) Command

The DEF CSP command displays the current Channelized Services Processor DS-1 parameters and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF CSP 1:ss[-1:ss]...**[**,1:ss[-1:ss]**]**

NOTE: *All DS-0 channels on a Channelized Services Processor must be disconnected when DS-1 parameters for that Channelized Services Processor are defined.*

After the command is entered, the supervisory port displays the current DS-1 parameters, Figure 6-6, for the Channelized Services Processor in the specified slot number. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the Digital Voice and Channelized Services Parameters chapter of the Configuration Planning Manual for parameter values.

If more than one slot number or a range of slot numbers is entered in the command, the supervisory port displays the parameters of the Channelized Services Processor in the first slot number specified. After the new parameter values are entered, the parameters of all Channelized Services Processors specified in the command are overwritten with the parameter values that are displayed.

NOTES: *If a DS-0 channel is connected on any Channelized Services Processor within a range, execution of a* ***local or remote*** *DEF CSP command will update only the Channelized Services Processors that have no connected DS-0 channels.*

The DEF CSP command enters the new parameters into the database but does not implement the changes. For the new parameters to take effect, the Channelized Services Processor(s) must be reset.

```
N0001>DEF CSP 1:16
FRAMNG    CLEAR CH    TX CLOCK    PCM TYPE    LN DRV    OOS BITS
G.732S                SYS         A-PCM       INT       7F

KG RATE   KG LEAD     KG MODE     KG POLR     INTL BIT  NATL BIT
5 SEC     SINGLE      PULSE       NEGATIVE    1         1F
```

Parameters are changed via menu selection:

FRAMING - Framing format
CLEAR CH - Clear channel
TX CLOCK - Source of transmit clock
PCM TYPE - PCM code law
LN DRV - Line driver type
OOS BITS - Out-of-service bit pattern
KG RATE - Retrain signal rate
KG LEAD - Retrain signal lead
KG MODE - Retrain signal mode
KG POLR - Retrain signal polarity
INTL BIT - International bit
NATL BIT - National bits

Figure 6-6. Typical Define Channelized Services Processor DS-1 Parameters (DEF CSP) Command

Define ISDN D-Channel Parameters (DEF DCM) Command

The DEF DCM command displays the current ISDN D-channel parameters and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF DCM **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

After the command is entered, the supervisory port displays the current ISDN D-channel parameters, Figure 6-7, for the D-Channel Module in the specified slot number. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the ISDN D-Channel Parameters chapter in the Configuration Planning Manual for parameter values.

If more than one slot number or a range of slot numbers is entered in the command, the supervisory port displays the parameters of the D-Channel Module in the first slot number specified. After the new parameter values are entered, the parameters of all D-Channel Modules specified in the command are overwritten with the parameter values that are displayed.

NOTE: *The DEF DCM command enters the new parameters into the database but does not implement the changes. For the new parameters to take effect, the D-Channel Module(s) must be reset.*

A maximum of six on-line D-Channel Modules are permitted per node. If more than six are defined, the message "TOO MANY DCMs IN NODE" is displayed. Redundant modules are not counted toward the maximum.

```
N0010>NOD 0077 DEF DCM 1:12
NET TYPE   NET PLAN   NET ID     SERVICE    INTRFACE   POLARITY
NATIONAL   CARRIER    586        PSN         05        NORMAL
```

Parameters are changed via menu selection:
NET TYPE - Network type
NET PLAN - Network plan
NET ID - Network ID
SERVICE - Service type
INTERFACE - Interface
POLARITY-Polarity

Figure 6-7. Typical Define ISDN D-Channel Parameters (DEF DCM) Command

Define Intermachine Link Parameters (DEF DL) Command

The DEF DL command displays the current intermachine link parameters and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF DL ss[-ss]...**[**,ss[-ss]**]**

Use the range version of the command to load parameters into a redundant Interlink Module simultaneously.

After the command is entered, the supervisory port displays the current intermachine link parameters, Figure 6-8, for the Interlink Module in the specified slot number. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the Intermachine Link Parameters chapter in the Configuration Planning Manual for parameter values.

If more than one slot number or a range of slot numbers is entered in the command, the supervisory port displays the parameters of the Interlink Module in the lowest slot number. After the new parameter values have been entered, the parameters of all Interlink Modules specified in the command will be overwritten with the parameter values that are displayed.

NOTE: *The DEF DL command enters the new parameters into the database but does not implement the changes. For the new parameters to take effect, the Interlink Module(s) must be reset. Exceptions are security, encryption, group, satellite delay, subrate multiplexing, alarm threshold, logical node translation, and node to translate, which take effect immediately.*

```
N0020>DEF DL 13
SPEED     RECEIVE   TXCLOCK   LN DRV    FRAME     SATDELAY  SATBUFF
48000     =TX SPD   SYS       EXT       02        NONE

ARQ       RXARQ     SYNCS     UNIT      SRM SEL   ALMTHLD   AL7MASK
3200                04,LVL1   MASTER    NO        DONT CARE OFF

SECURITY  ENCRYPT   GROUP     TRNSLATE  NOD2TRNS  LFM SLOT  LFM BNDL
DISABLE   NO        -------   OFF                 NONE

LINKBACK  LINK EXP  ACCESS    OOS TIME
1:10:05   1:10:01   TO SUBNET SYS
```

Parameters are changed via menu selection:

SPEED - Intermachine link speed (bps)◊
RECEIVE - Receive Intermachine link speed
TXCLOCK - Source of transmit clock
LN DRV - Line driver type and speed (internal or external mandatory)
FRAME - Frame mode
SATDELAY - Satellite delay
SATBUFF - Satellite buffer size (bits)
ARQ - Supervisory channel bandwidth (bps)
RXARQ - Receive supervisory channel bandwidth (bps)
SYNCS - Number of sync characters per scan cycle and sync character level
UNIT - Master/slave designation
SRM SEL - Subrate multiplexing
ALMTHLD - Alarm threshold
AL7MASK - Intermachine link alarm 7 masking
SECURITY - Intermachine link security (disable/enable)
ENCRYPT - Encryption
GROUP - Group assignment
TRNSLATE - Logical node translation
NOD2TRNS - Node to translate
LFM SLOT - Link Framing Module slot
LFM BNDL - Link Framing Module bundle
LINKBACK - Link backup bundle
LINK EXP - Link expansion bundle
ACCESS - Direction of intermachine link connection (to backbone or to subnetwork)
OOS TIME - Out-of-service timer

◊ = When value displayed is followed by a "g", the speed is not supported by Network Module type installed. The speed is recognized by the LINK/2+ System but external clocking is required (i.e., TXCLOCK cannot be SYS).

Figure 6-8. Typical Define Intermachine Link Parameters (DEF DL) Command

Define Destination Channel (DEF DST CH, DEF DST DS0, DEF DST XS0) Commands

The DEF DST CH, DEF DST DS0, and DEF DST XS0 commands define channel connections:

- The DEF DST CH command defines connection from an I/O channel to another I/O channel or to a DS-0 channel, or to an X.50 subrate channel. The DEF DST CH command is the same as the DEF CON command.
- The DEF DST DS0 command defines connection from a DS-0 channel to another DS-0 channel, to an I/O channel, or to an X.50 DS-0 channel.
- The DEF DST XS0 command defines connection from an X.50 DS-0 channel to another X.50 DS-0 channel, an I/O channel, or to a DS-0 channel.

Commands:

[NOD xxxx] DEF DST CH n_L:ss_L:c_L[-n_L:ss_L:c_L]/Nxxxx **{**Cn_D:ss_D:c_D[-n_D:ss_D:c_D] *or* Dn_D:ss_D:cc_D[-n_D:ss_D:cc_D] *or* Xn:ss:cc:sr[-n:ss:cc:sr]**}**

where:

n_L:ss_L:c_L	=	local I/O channel number
/Nxxxx	=	node number of destination channel
Cn_D:ss_D:c_D	=	destination I/O channel number; **must be at a remote node**
Dn_D:ss_D:cc_D	=	destination DS-0 channel; can be at local or remote node
Xn_D:ss_D:cc_D:sr_D	=	destination X.50 subrate channel; can be at local or remote node

NOTE: *A channel must be defined before that channel's destination is defined. Otherwise, the message "UNDEFINED CHANNEL" is displayed.*

[NOD xxxx] DEF DST DS0 n_L:ss_L:cc_L[-n_L:ss_L:cc_L]/Nxxxx **{**Dn_D:ss_D:cc_D[-n_D:ss_D:cc_D] *or* Cn_D:ss_D:c_D[-n_D:ss_D:c_D] *or* Xn_D:ss_D:cc_D[-n_D:ss_D:cc_D]**}**

where:

n_L:ss_L:cc_L	=	local DS-0 channel number
/Nxxxx	=	node number of destination channel
Dn_D:ss_D:cc_D	=	destination DS-0 channel number; can be at local or remote node
Cn_D:ss_D:c_D	=	destination I/O channel number; can be at local or remote node
Xn_D:ss_D:cc_D	=	destination X.50 DS-0 channel number; can be at local or remote node

[NOD xxxx] DEF DST XS0 n_L:ss_L:cc_L[-n_L:ss_L:cc_L]/Nxxxx **{**Xn_D:ss_D:cc_D[-n_D:ss_D:cc_D] *or* Cn_D:ss_D:c_D[-n_D:ss_D:c_D] *or* Dn_D:ss_D:cc_D[-n_D:ss_D:cc_D]**}**

where:

n_L:ss_L:cc_L	=	local DS-0 channel number
/Nxxxx	=	node number of destination channel
Xn_D:ss_D:cc_D	=	destination X.50 DS-0 channel number; can be at local or remote node
Cn_D:ss_D:c_D	=	destination I/O channel number; can be at local or remote node
Dn_D:ss_D:cc_D	=	destination DS-0 channel number; can be at local or remote node

NOTE: *To connect channels via a DS-1 trunk, a Voice Processor, Integrated Trunk Module, or Channelized Services Processor must be in both the local and remote nodes. A connection must be defined between the channels and Voice Processor or Channelized Services Processor DS-0 channels at the local node, and the channels and Voice Processor or Channelized Services Processor DS-0 channels at the remote node. The CON DS0 or CON CH command must be issued to the originator channels at the local and remote nodes.*

Channel connections must be defined in the LINK/2+ System database for each end of the channel. For example:

- Single channel connection—To define a connection between I/O channel 1:5:1 at node 12 and DS-0 channel 1:6:10 at node 21, enter the following commands:

  NOD 12 DEF DST CH 1:5:1/N21 DS0

  NOD 21 DEF DST DS0 1:6:10/N12 C1:5:1

- Range of channel connections—To define connections between channels 1:5:1-1:5:4 at node 12 and channels 1:6:1-1:6:4 at node 21, enter the following commands:

  NOD 12 DEF DST CH 1:5:*/N21 C1:6:*

  NOD 21 DEF DST CH 1:6:*/N12 C1:5:*

- Voice Processor or Channelized Services Processor connections—To define a connection between I/O channel 1:16:1 at node 6 and I/O channel 1:12:1 at node 10 via a DS-1 trunk, where Channelized Services Processor DS-0 channel 1:8:4 is at node 6 and Channelized Services Processor DS-0 channel 1:9:8 is at node 10, enter the following commands:

  NOD 6 DEF DST CH 1:16:1/N6 DS0

  NOD 6 DEF DST DS0 1:8:4/N6 C1:16:1

  NOD 10 DEF DST CH 1:12:1/N10 DS0

  NOD 10 DEF DST DS0 1:9:8/N10 C1:12:1

- D-channel connections—To define a connection between D-channel 1:17:1 at node 6 and Integrated Trunk Module DS-0 1:10:24 at node 6, enter the following commands:

  NOD 6 DEF DST DS0 1:10:24/N6 C1:17:1

  NOD 6 DEF DST CH 1:17:1/N6 D1:10:24

Channels must be disconnected before the DEF DST CH and DEF DST DS0 commands are issued. After the commands are issued, the channels must be reconnected for the changes to take effect.

To implement the channel connection changes, the channel(s) must be disconnected and then connected as follows:

- If a channel is currently disconnected, issue the DEF DST CH, DEF DST DS0, or DEF DST XS0 command to change the channel connections. Then, enter the CON CH or CON DS0 command to connect the channels and implement the changes.

- If a channel is currently connected, enter the DSC CH or DSC DS0 command to disconnect the channel. Issue the DEF DST CH, DEF DST DS0, or DEF DST XS0 command to change the channel connections. Then, enter the CON CH or CON DS0 command to connect the channels and implement the changes.

Define Destination X.50 Subrate Channel (DEF DST XCH) Command

The DEF DST XCH command defines the connection from an X.50 subrate channel to another X.50 subrate channel or to an I/O channel.

Command:

[NOD xxxx] DEF DST XCH n_L:ss_L:cc_L:sr_L[-n_L:ss_L:cc_L:sr_L]/Nxxxx
{Xn_D:ss_D:cc_D:sr_D[-n_D:ss_D:cc_D:sr_D] *or* Cn_D:ss_D:c_D[-n_D:ss_D:c_D]

where:

n_L:ss_L:cc_L:sr_L	=	local X.50 subrate channel number
/Nxxxx	=	node number of destination channel
Xn_D:ss_D:cc_D:sr_D	=	destination X.50 subrate channel; can be at local or remote node
Cn_D:ss_D:c_D	=	destination I/O channel number; can be at local or remote node

Define DS-0 Channel Parameters (DEF DS0) Command

See "Define Channel Parameters (DEF CH/, DEF DS0, DEF MDS0) Commands" paragraph.

Define Voice Processor DS-1 Parameters (DEF DS1) Command

The DEF DS1 command displays the current Voice Processor DS-1 parameters and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF DS1 n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**

Use the range version of the command to load parameters into a redundant Voice Processor simultaneously.

NOTE: *All DS-0 channels on a Voice Processor must be disconnected when DS-1 parameters for that Voice Processor are defined.*

After the command is entered, the supervisory port displays the current DS-1 parameters, Figure 6-9, for the Voice Processor in the specified slot number. Select new parameters per "Making

Menu Selections" paragraph in Chapter 3, General Information. See the Digital Voice and Channelized Services Parameters chapter in the Configuration Planning Manual for parameter values.

If more than one slot number or a range of slot numbers is entered in the command, the supervisory port displays the parameters of the Voice Processor in the first slot number specified. After the new parameter values are entered, the parameters of all Voice Processors specified in the command are overwritten with the parameter values that are displayed.

NOTES: *If a DS-0 channel is connected on any Voice Processor within a range, execution of a* ***local*** *or remote DEF DS1 command will update only the Voice Processors that have no connected DS-0 channels.*

The DEF DS1 command enters the new parameters into the database but does not implement the changes. For the new parameters to take effect, the Voice Processor(s) must be reset.

Define External Port Parameters (DEF EP) Command

The DEF EP command displays the current parameter values of the external port that interfaces the LINK/2+ System to a LINK/CSU and allows the user to change parameter values in the database.

```
N0001>DEF DS1 1:9
FRAMING   CLEAR CH  TX CLOCK  PCM TYPE  TX ADPCM  LN DRV    OOS BITS
D4        NO        RCV       MU-PCM    ANSI      EXT

ILP MODE  KG RATE   KG LEAD   KG MODE   KG POLR   INTL BIT  NATL BIT
SCAN      30 SEC    BOTH      PULSE     NEGATIVE

SEIZURE   PRE-EMPT  ORIG DSC  SEIZE ON
500 MS    2 SEC     33.0 MS   SPACE
```

Parameters are changed via menu selection:

FRAMING - Framing format
CLEAR CH - Clear channel
TX CLOCK - Source of transmit clock
PCM TYPE - PCM code law
TX ADPCM - Transport ADPCM
LN DRV - Line driver type
OOS BITS - Out-of-service bit pattern
ILP MODE - Mode of operation
KG RATE - Retrain signal rate
KG LEAD - Retrain signal lead
KG MODE - Retrain signal mode
KG POLR - Retrain signal polarity
INTL BIT - Internationl bits
NATL BIT - National bits
SEIZURE - Seizure time
PRE-EMPT - Preemption timer
ORIG DSC - Originator disconnect time
SEIZE ON - Seizure polarity

Figure 6-9. Typical Define Voice Processor DS-1 Parameters (DEF DS1) Command

Command:

[NOD xxxx] DEF EP

After the command is entered, the supervisory port displays the current parameters, Figure 6-10. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the System Parameters chapter in the Configuration Planning Manual for parameter values.

```
N0001>DEF EP
SPEED        STOP         PARITY       DATA
9600         01           EVEN         07
```

Parameters are changed via menu selection:
SPEED - External port speed (bps)
STOP - Number of stop bits
PARITY - Type of parity
DATA - Number of data bits

Figure 6-10. Typical Define External Port Parameters (DEF EP) Command

Define Integrated Trunk Module DS-1 Parameters (DEF ILQ) Command

The DEF ILQ command displays the current Integrated Trunk Module DS-1 parameters and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF ILQ 1:ss[-1:ss]...**[**,1:ss[-1:ss]**]**

NOTE: *All bundles on an Integrated Trunk Module must be disconnected when DS-1 parameters for that Integrated Trunk Module are defined.*

After the command is entered, the supervisory port displays the current DS-1 parameters, Figure 6-11, for the Integrated Trunk Module in the specified slot number. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the Integrated Trunk Parameters chapter in the Configuration Planning Manual for parameter values.

If more than one slot number or a range of slot numbers is entered in the command, the supervisory port displays the parameters of the Integrated Trunk Module in the first slot number specified. After the new parameter values are entered, the parameters of all Integrated Trunk Modules specified in the command are overwritten with the parameter values that are displayed.

NOTES: *If a DS-0 channel is connected on any Integrated Trunk Module within a range, execution of a* ***local*** *DEF ILQ command will update only the Integrated Trunk Modules that have no connected DS-0 channels.*

The DEF ILQ command enters the new parameters into the database but does not implement the changes. For the new parameters to take effect, the Integrated Trunk Module(s) must be reset.

```
N0020>DEF ILQ 1:12
FRAMING   CLEAR CH  TX CLOCK  PCM TYPE  LFM SLOT  LFM BNDL
G.732N    YES       SYS       MU-PCM

LN DRV    OOS BITS  INTL BIT  NATL BIT  CRC-4
EXT       7F        1         1F        ENABLE
```

Parameters are changed via menu selection:

FRAMING - Framing format
CLEAR CH - Clear channel
TX CLOCK - Source of transmit clock
LN DRV - Line driver type
OOS BITS - Out-of-service bit pattern
INTL BIT - International bit
PCM TYPE - PCM code law
LFM SLOT - Link Framing Module slot
LFM BUNDLE - Link Framing Module bundle
NATL BIT - National bits
CRC-4 - Cyclic redundancy check

Figure 6-11. Typical Define Integrated Trunk Module DS-1 Parameters (DEF ILQ) Command

Define Link Framing Module Parameters (DEF LFM) Command

The DEF LFM command displays the current Link Framing Module parameters (Models LFM.3, LFM.10, LFM.11, LFM.12, and LFM.14) and allows the user to change parameter values in the database.

Commands:

[NOD xxxx] DEF LFM 3 n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**

[NOD xxxx] DEF LFM 10 n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**

[NOD xxxx] DEF LFM 11 n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**[/1]

[NOD xxxx] DEF LFM 12 n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**[/1 *or* /2]

[NOD xxxx] DEF LFM 14 n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**

where: /1 = establishes two-to-one mode of operation
/2 = establishes two-to-two mode of operation

If no mode of operation is specified, the DEF LFM command establishes one-to-one mode of operation. The LFM.3 and LFM.10 Modules operate in one-to-one mode only. The LFM.14 Module may operate in one-to-one, two-to-one, three-to-one, or four-to-one mode, however, a qualifier is not used.

After the command is entered, the supervisory port displays the current Link Framing Module parameters, Figure 6-12, for the Link Framing Module(s) in the specified slot range. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the Link Framing Parameters chapter in the Configuration Planning Manual for parameter values.

```
N0097>DEF LFM 3 1:7

SPEED      TX CLOCK      TX CRC      RX CRC
512K - 8   SYS           ENABLE      ENABLE
```

SPEED - Intermachine link speed and DS-0 count
TX CLOCK - Source of transmit clock
TX CRC - Transmit CRC
RX CRC -Receive CRC

A. TYPICAL DEF LFM 3 COMMAND

```
N0097>DEF LFM 10 1:7

A:FRAME      B:FRAME
D4

A:SPEED      A:LN DRV     A:LENGTH    A:TX CLK     A:YELLOW     A:B8ZS
1536K=64X24  EXT          ->133 FT    SYS          DISABLE      ENABLE
```

FRAME - Framing format
SPEED - Intermachine link speed and DS-0 count/bundle size
LN DRV - Line driver type
LENGTH - DSX-1 line length
TX CLK - Source of transmit clock
YELLOW - Yellow alarm
B8ZS - Bipolar operation

B. TYPICAL DEF LFM 10 COMMAND

Figure 6-12. Typical Define Link Framing Module Parameters (DEF LFM) Commands (Sheet 1 of 3)

```
N0097>DEF LFM 11 1:9/1

A:FRAME      B:FRAME
D4

A:SPEED      A:LN DRV    A:LENGTH    A:TX CLK    A:YELLOW    A:B8ZS
256K=64X4    EXT         ->267 FT    SYS         ENABLE      ENABLE

B:SPEED      B:LN DRV    B:LENGTH    B:TX CLK    B:YELLOW    B:B8ZS
56K=56X1
```

FRAME - Framing format
A: - Parameters for connection A
B: - Parameters for connection B, not used except for speed
SPEED - Intermachine link speed and DS-0 count/bundle size
LN DRV - Line driver type
LENGTH - DSX-1 line length
TX CLK - Source of transmit clock
YELLOW - Yellow alarm
B8ZS - Bipolar operation

C. TYPICAL DEF LFM 11 COMMAND

```
N0097>DEF LFM 12 1:11/2

A:FRAME      B:FRAME
D4           D4

A:SPEED      A:LN DRV    A:LENGTH    A:TX CLK    A:YELLOW    A:B8ZS
56K=56X1     EXT         ->267 FT    SYS         ENABLE      ENABLE

B:SPEED      B:LN DRV    B:LENGTH    B:TX CLK    B:YELLOW    B:B8ZS
56K=56X1     EXT         ->267 FT    SYS         ENABLE      ENABLE
```

A:FRAME - Framing format, connection A
B:FRAME - Framing format, connection B
A: - Parameters for connection A
B: - Parameters for connection B
SPEED - Intermachine link speed and DS-0 count/bundle size
LN DRV - Line driver type
LENGTH - DSX-1 line length
TX CLK - Source of transmit clock
YELLOW - Yellow alarm
B8ZS - Bipolar operation

D. TYPICAL DEF LFM 12 COMMAND

Figure 6-12. Typical Define Link Framing Module Parameters (DEF LFM) Commands (Sheet 2)

```
N0097>DEF LFM 14 1:13

A:MODULE      A:SPEED      B:MODULE      B:SPEED
UNFRAMED      64K=64X1     D5            1544K

C:MODULE      C:SPEED      D:MODULE      D:SPEED
UNFRAMED      1536K=64X24  NONE
```

A:MODULE - Framing format for connection A
A:SPEED - Speed and DS-0 count/bundle size for connection A
B:MODULE - Framing format for connection B
B:SPEED - Speed and DS-0 count/bundle size for connection B
C:MODULE - Framing format for connection C
C:SPEED - Speed and DS-0 count/bundle size for connection C
D:MODULE - Framing format for connection D
D:SPEED - Speed and DS-0 count/bundle size for connection D

E. TYPICAL DEF LFM 14 COMMAND

Figure 6-12. Typical Define Link Framing Module Parameters (DEF LFM) Commands (Sheet 3)

If more than one slot number or a range of slot numbers is entered in the command, the supervisory port displays the parameters of the Link Framing Module in the first slot number specified. After the new parameter values are entered, the parameters of all Link Framing Modules specified in the command are overwritten with the parameter values that are displayed.

NOTE: *The DEF LFM command enters the new parameters into the database but does not implement the changes. For the new parameters to take effect, the Link Framing Module(s) must be reset.*

Define Master Clocking List (DEF MCL) Command

The DEF MCL command defines the remote master clocking node(s) that will receive "alive and well" and clock status messages from the local master clocking node. Up to 15 nodes can be placed on a master clocking list.

Each master clocking node should have a master clocking list defined. This enables each master clocking node in the network to know the status of the other master clocking nodes. Use the DSP ST CLK command to determine the status of the master clocking node(s).

Command:

[NOD xxxx] DEF MCL

After the command is entered, the supervisory port prompts the user to define the entries for the master clocking list. Each entry is defined by entering a master clocking node number, Figure 6-13. After the last master clocking node number is entered, the define master clocking list command is exited by pressing the RETURN key.

```
N0001>DEF MCL
ENTRY  01: 25
ENTRY  02: 550
ENTRY  03: 252
ENTRY  04: 165
ENTRY  05: 130
ENTRY  06: 236
ENTRY  07: 30
ENTRY  08: 66
ENTRY  09: 75
ENTRY  10: 122
ENTRY  11: 108
ENTRY  12: 1120
ENTRY  13: 20
ENTRY  14: 59
ENTRY  15: 23
```

Figure 6-13. Typical Define Master Clocking List (DEF MCL) Command

Define Master DS-0 Channels (DEF MDS0) Command

See "Define Channel Parameters (DEF CH/, DEF DS0, DEF MDS0) Commands" paragraph.

Define Master Clocking Nodes (DEF MM) Command

The DEF MM command defines a node as a master clocking node for the network and assigns a clock priority to the node. Up to 16 nodes can be defined as master clocking nodes. Each master clocking node should be defined with a different clock priority.

Command:

[NOD xxxx] DEF MM cpr

where: cpr = clock priority of the specified master clocking node. Clock priority is from 1 to 16, where 1 is the highest clock priority.

For example, to define node 18 as a master clocking node with priority 1, enter:

NOD 18 DEF MM 1

The purpose of multiple master clocking node(s) is to guarantee under all conditions that there will be an independent clock source in the network. If all independent clock sources in all multiple master clocking nodes are inoperable, the multiple master clocking node with the highest priority will use its internal oscillator to provide timing to the network until an independent clock source at any multiple master clocking node becomes operational.

Define Broadcast/Polling Master Channel (DEF MSR POL) Command

The DEF MSR POL command defines the broadcast/polling master channel. The specified channel will become the broadcast/polling master channel if the following requirements are met:

- A previous connection for the channel does not exist.
- The channel is defined for broadcast/polling.
- The channel is not a member of a broadcast/polling group.

The master broadcast/polling channel will connect to the host channel at the originating node. All broadcast/polling members associated with a master broadcast/polling channel communicate to the host channel via the connection established between the host channel and the master broadcast/polling channel.

Command:

[NOD xxxx] DEF MSR POL n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]**

For example, to define channel 1 of the Quad Synchronous Processor located in nest 1, slot 16 as a master channel, enter:

```
DEF MSR POL 1:16:1
```

NOTE: *Channel(s) must be disconnected before the DEF MSR POL command is issued. After the command is issued, the channel(s) must be reconnected for the changes to take effect.*

Define Node Number (DEF NOD) Command

The DEF NOD command enters the node number of the local LINK/2+ System in the database. The node number identifies the LINK/2+ System in all remote commands and on the alarm notification list.

Command:

DEF NOD xxxx

The DEF NOD command must be entered locally at each LINK/2+ System.

Upon completion of the DEF NOD command, the node must be reset.

Define Intermachine Link Out-Of-Service Time (DEF OOS) Command

The DEF OOS command defines the time in seconds that an intermachine link may be continuously out-of-sync before the intermachine link is declared out-of-service. This parameter applies to all intermachine links at a node.

Command:

[NOD xxxx] DEF OOS tt

where: tt = 2, 4, 6, 8, 10, 12, 14, or 16 seconds

When an intermachine link is out-of-sync beyond the specified time, the out-of-service alarm 07 is displayed on an idle supervisory terminal and also logged in the alarm table. If the out-of-service time is changed, the Integrated Trunk Module DS-1 database receives the update through a reset of the module or of any proprietary bundle on the module. The Interlink Module receives the update through a reset of the module.

Define and Clear Broadcast/Polling Group Members (DEF POL, CLR POL) Commands

The DEF POL command defines the specified channel(s) to a broadcast/polling group with the specified master channel. The channel will become a member of the broadcast/polling group if the following requirements are met:

- The channel is defined for broadcast/polling.
- The channel is not defined and connected to another broadcast/polling group. If the channel is defined to another broadcast/polling group but is not connected, the channel is redefined to the specified broadcast/polling group.
- The channel speed, mode of transmitting EIA functions, and broadcast/polling sensitivity mode are the same as those defined for the master channel.
- A previous connection for the channel does not exist.
- The channel is not a master channel.

The CLR POL command disconnects and clears the specified channel from the associated broadcast/polling group. A master channel cannot be disconnected and cleared if the following conditions exist:

- A connection for the master channel exists.
- Broadcast/polling group members are associated with the master channel.

Commands:

[NOD xxxx] DEF POL n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]**/M n:ss:c
[NOD xxxx] CLR POL **{**** or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/A]

where:

/M n:ss:c = specifies the master broadcast/polling channel the broadcast/polling group member is associated with
/A = clears the master broadcast/polling channel and all broadcast/polling group members associated with the specified master channel

NOTE: *The CLR POL command must be issued with the /A modifier to disconnect and clear a master broadcast/polling channel.*

For example, to define channel 3 of the Quad Synchronous Processor located in nest 1, slot 16 to the broadcast/polling group with master channel 1:16:1, enter:

DEF POL 1:16:3/M 1:16:1

To disconnect and clear master channel 1:16:1, enter:

CLR POL 1:16:1/A

NOTE: *Channel(s) must be disconnected before the DEF POL command is issued. After the command is issued, the channel(s) must be reconnected for the changes to take effect.*

Define and Clear ABM Profile (DEF PRO, CLR PRO) Commands

The DEF PRO command defines parameters for a single ABM profile.

Command:

[NOD xxxx] DEF PRO ppp

where: ppp = ABM profile (1-250)

After the command is entered, the supervisory port displays parameters for the specified ABM profile number, Figure 6-14. Select parameter values per "Making Menu Selections" paragraph in Chapter 3, General Information. See the Advanced Bandwidth Management Profile Parameters chapter in the Configuration Planning Manual for parameter values.

Once an ABM profile has been defined, individual parameter values can be changed using the SET PRO command.

To assign an ABM profile to I/O and DS-0 channels, use the SET CH command.

The CLR PRO command deletes previously defined ABM profiles which will no longer be used at a node.

Command:

[NOD xxxx] CLR PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**

where: ppp = ABM profile (1-250)
* = all ABM profiles

```
N0001>DEF PRO 3
ENCRYPT     MAXSAT     LNKEPR     LNKGRP     GROOMING
DONT CARE   DONT CARE  GOOD <E-4  DONT CARE  DISABLE

BMPSTATE   BMPLEVEL   OVERRIDE
DISABLE                DISABLE
```

Parameters are changed via menu selection:

ENCRYPT - Encryption
MAXSAT - Satellite threshold
LNKEPR - Link error performance
LNKGRP - Link group
GROOMING - Grooming enable/disable
BMPSTATE - Bumping state
BMPLEVEL - Bumping level (selectable only if bumping state is bumper, bumpee, or both)
OVERRIDE - Override enable/disable

Figure 6-14. Typical Define ABM Profile (DEF PRO) Command

Define System Maximum Phasor Size (DEF PSZ) Command

The DEF PSZ command defines the system maximum phasor buffer size.

Command:

[NOD xxxx] DEF PSZ pp

where: pp = 8, 10, 12, or 14 bytes

To program a channel to use the system maximum phasor size, set the channel PHASOR parameter to MX.

NOTE: *To change the system maximum phasor size, channels using this parameter must be disconnected before the DEF PSZ command is issued. After the command is issued, the channels must be reconnected for the changes to take effect.*

Define Quality (DEF QUA) Command

The DEF QUA command allows you to change parameter values for performance monitoring of the interface of the Voice Processor(s) and Channelized Services Processor(s) specified, Figure 6-15. Use the DSP ST QUA command to view the framing errors reported for the parameters defined by the DEF QUA command.

Command:

[NOD xxxx] DEF QUA **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

```
N0001>DEF QUA 1:11

ALARM                                :  ENABLE
SAMPLE INTERVAL                      :  10 SEC
ERROR TEST PERIOD                    :  24 HR
SEVERE ERROR TEST PERIOD             :  30 MIN
SEVERE ERROR                         :  100
ERROR THRESHOLD                      :  1200
SEVERE ERROR THRESHOLD               :  200
```

ALARM through SEVERE ERROR TEST PERIOD parameters are changed via menu selection; SEVERE ERROR through SEVERE ERROR THRESHOLD parameters are entered from keyboard.

ALARM - Enable/disable quality alarm report
SAMPLE INTERVAL - Quality sample interval
ERROR TEST PERIOD - Error test period
SEVERE ERROR TEST PERIOD - Severe error test period
SEVERE ERROR - Number of errors in sample interval that, if exceeded, will be declared a severe error
ERROR THRESHOLD - Error threshold
SEVERE ERROR THRESHOLD - Severe error threshold

Figure 6-15. Typical Define Quality (DEF QUA) Command

Define System Connect Retry Timer (DEF RET) Command

The DEF RET command defines the time the Network Module at an originator node will wait before reattempting to connect to the channel at the terminator node when:

- Channels become disconnected because an intermachine link has failed.
- The previous attempt to connect failed because bandwidth was not available.
- Channel was groomed by translation node.

Command:

[NOD xxxx] DEF RET zz

where: zz = a retry timer number (00, 02 to 16) that corresponds to a time in seconds given by:

retry timer number x 15 = waiting time in seconds

NOTE: *An exception is the retry timer number 00. This number produces a waiting time of 2 seconds for the first reconnect attempt. The timer is changed to 8, 16, and 30 seconds for each subsequent attempt.*

For example, if the retry timer is 02, the actual Network Module waiting time in seconds before reattempting to connect a channel is:

02 x 15 = 30 seconds

Define and Clear Routing Table (DEF RTE, CLR RTE) Commands

The DEF RTE command defines a routing table that specifies all possible intermachine link paths from an originating node (physical node) to a destination node (physical or logical node). Routing tables must be defined so that remote commands and channel connections can be executed. Defining all possible paths in the routing table helps to ensure that communication between two nodes will continue even in the event of multiple intermachine link failures.

Command:

[NOD xxxx] DEF RTE xxxx[/F]

where: /F = allows the user to define the routing paths in any order of path delay

To remotely define a routing table, at least one path to the remote supervisory terminal must be programmed at each node in the path. Typically, these routing tables are preprogrammed prior to shipment.

After the command is entered, the supervisory port prompts the user to define the paths from the originating node to the specified destination node. Each path is defined by entering:

- Interlink Module slot number, or Integrated Trunk Module proprietary bundle slot and bundle number
- Path delay number

The path delay is the minimum number of bypass nodes between the originating node and the destination node. For point-to-point connections, the path delay number is 0. **If the DEF RTE command is issued without the /F modifier, paths must be defined in ascending order of path delay.**

After the last intermachine link number and path delay are entered, the define routing table command is exited by pressing the RETURN key.

To illustrate, Figure 6-16 shows a typical network. The routing from physical node 5 to physical node 4 or logical node 10, for example, can take four possible paths—link 3, 5:7, 7, or 9.

If the DEF RTE command is issued WITHOUT the /F modifier, the routing is defined as follows:

- When link 5:7 is used, the path delay is 0, i.e., point-to-point connection. Therefore, the path using link 5:7 should be the first entry in the routing table.
- When link 7 or 9 is used, the path delay is 1, i.e., one other node—node 7—must be bypassed. Since both paths have the same path delay, decide which intermachine link is preferable and enter that intermachine link path first, then enter the other intermachine link path in the routing table.
- When link 3 is used, the path delay is 3, i.e., three other nodes—nodes 3, 1, and 2—must be bypassed. This path has the longest path delay and should be entered last in the routing table.

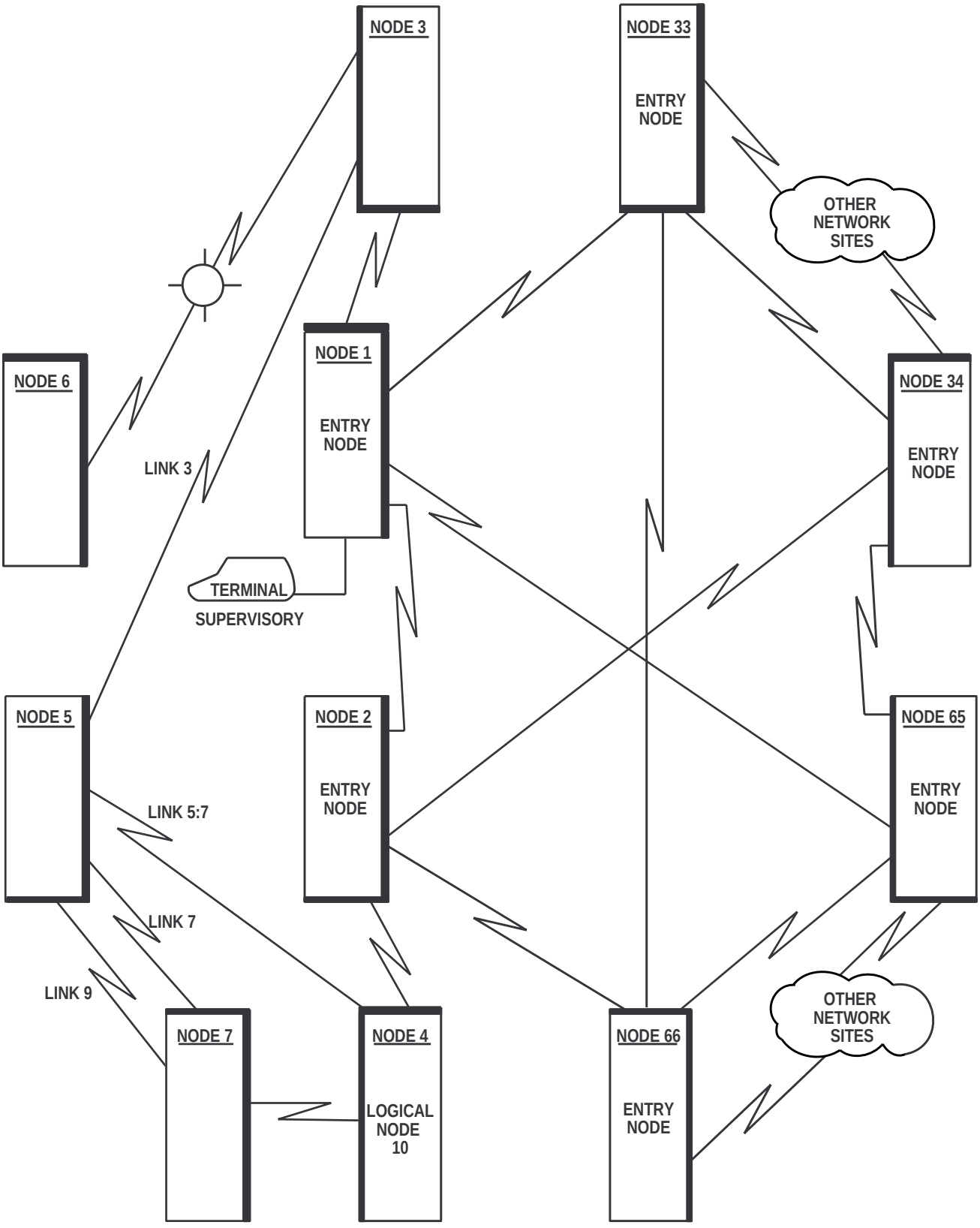


Figure 6-16. Sample Network to Be Routed

If the DEF RTE command is issued WITH the /F modifier, the paths can be entered in any order, e.g., link 3 can be the first entry in the routing table even though that path has the longest path delay.

Figure 6-17 shows sample DEF RTE commands for defining the routing table from physical node 5 to physical node 4.

Observe the following guidelines when defining routing tables:

- Up to eight different paths can be defined in each routing table.
- An intermachine link number may appear only once in the same routing table.
- For an intermachine link with redundant Interlink Modules, enter the slot number of the primary module only, i.e., the odd-numbered slot.
- For an intermachine link with redundant Integrated Trunk Modules, enter the slot and bundle number of the primary Integrated Trunk Module only, i.e., the odd-numbered slot.
- The maximum path delay number that can be entered in a routing table is 7.

```
N0001>NOD 5 DEF RTE 4
PATH 1 DL= 5:7
PATH 1 PD= 0
PATH 2 DL= 7
PATH 2 PD= 1
PATH 3 DL= 9
PATH 3 PD= 1
PATH 4 DL= 3
PATH 4 PD= 3
PATH 5 DL=
```

N0001>NOD 5 DEF RTE 4 - Defines route from physical node 5 to physical node 4

PATH 1 DL= 5:7 - Intermachine link slot and bundle number for path 1

PATH 1 PD= 0 - Path delay for path 1

PATH 2 DL= 7, PATH 2 PD= 1 - Intermachine link slot and bundle numbers and path delay numbers for alternate paths, entered in ascending order of path delay. Up to eight paths can be defined.

A. WITHOUT /F MODIFIER

```
N0001>NOD 5 DEF RTE 4/F
PATH 1 DL= 9
PATH 1 PD= 1
PATH 2 DL= 7
PATH 2 PD= 1
PATH 3 DL= 3
PATH 3 PD= 3
PATH 4 DL= 5:7
PATH 4 PD= 0
PATH 5 DL=
```

N0001>NOD 5 DEF RTE 4 - Defines route from physical node 5 to physical node 4

PATH 1 DL= 9 - Intermachine link slot for path 1

PATH 1 PD= 1 - Path delay for path 1

PATH 2 DL= 7, PATH 2 PD= 1 - Intermachine link slot and bundle numbers and path delay numbers for alternate paths, entered in any order of path delay. Up to eight paths can be defined.

B. WITH /F MODIFIER

Figure 6-17. Typical Define Routing Table (DEF RTE) Commands

The CLR RTE command clears the routing table entries for the specified node(s).

Command:

[NOD xxxx] CLR RTE xxxx[-xxxx]...**[**,xxxx[-xxxx]**]**

NOTE: *Entering a remote command NOD $xxxx_1$ CLR RTE $xxxx_2$ from node $xxxx_2$ should be avoided, since node $xxxx_2$ will no longer communicate with node $xxxx_1$.*

Define Station Clock Speed (DEF SC) Command

The DEF SC command displays the current station clock speeds and allows the user to change parameter values in the database. Station clock speeds must be defined if station clock 1 or station clock 2 will be used as a system clock source.

Command:

[NOD xxxx] DEF SC

After the command is entered, the supervisory port displays the current station clock speeds, Figure 6-18. Select new speeds per "Making Menu Selections" paragraph in Chapter 3, General Information. See the System Parameters chapter in the Configuration Planning Manual for parameter values.

Once the station clock speeds are defined, station clock 1 or station clock 2 can be entered on the system clock fallback list using the DEF CFB command.

```
N0001>DEF SC
ST CLK-1 576000
ST CLK-2 576000
```

ST CLK-1 - Speed of station clock 1 **ST CLK-2 -** Speed of station clock 2

Figure 6-18. Typical Define Station Clock Speed (DEF SC) Command

Define Supervisory Port Parameters (DEF SP) Command

The DEF SP command displays the current supervisory port parameters and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF SP

After the command is entered, the supervisory port displays the current parameters, Figure 6-19. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General

Information. See the System Parameters chapter in the Configuration Planning Manual for parameter values.

For the LINK/2+ System to use the parameter values programmed in the database, Network Module DIP switch must be set to use database parameters; otherwise, default supervisory port parameters are used:

- Speed: 9600 bps
- Stop bits: 1
- Data bits/parity: 8 data bits, no parity

See the Network Module chapter in the LINK/2+ Installation and Maintenance Manual for Network Module DIP switch settings.

Communications must be established between the supervisory terminal and supervisory port before the DEF SP command can be used to change **local** supervisory port parameters. Initial communications can be established by programming local supervisory port parameters from a supervisory computer port or a remote supervisory port, or by using default parameter values for the local supervisory port.

```
N0001>NOD 6 DEF SP

SPEED     STOP     DATA
1200      01       8 BITS NONE
```

Parameters are changed via menu selection:
SPEED - Supervisory port speed (bps)
STOP - Number of stop bits
DATA - Number of data bits and type of parity

Figure 6-19. Typical Define Supervisory Port Parameters (DEF SP) Command

Define and Clear Speed Profile (DEF SPR, CLR SPR) Commands

The DEF SPR command defines the Isochronous Communication Module speed(s) for the specified profile number, Figure 6-20. The CLR SPR command clears the Isochronous Communication Module speed(s) defined for the specified profile number.

Commands:

[NOD xxxx]DEF SPR sp
[NOD xxxx]CLR SPR sp

where: sp = speed profile number (1-16)

To define the speed(s), use the F key or B key to scroll through the speed selections. Press the SPACE bar for each speed you want to select. A plus sign (+) appears next to the speed when it is selected. Upon completing selections, press RETURN key. The valid speed(s) selected for the profile are displayed. See Isochronous I/O Channel Parameters chapter in the Configuration Planning Manual for more information on speed profiles.

NOTE: *When selecting speeds for the profile, the SPACE bar is used to toggle the plus sign that appears next to a speed. If the plus sign appears, the speed is selected for the profile. Otherwise the speed is not selected for the profile.*

```
N0001>DEF SPR 4
PROF: 04
 1544000+

PROF:  04    1544000    1064000    728000    504000    336000
              224000     153600    100000     64000     40800
               19200
```

PROF: - Speed profile number **19200 -** Selected speeds (bps)
1544000+ - Defined profile speed indicator (plus sign)
NOTE: When INVALID is displayed instead of a valid speed, a speed not supported by the Isochronous Communication Module was defined via TIME/VIEW or the computer port.

Figure 6-20. Typical Define Speed Profile (DEF SPR) Command

Define and Clear Voice Profile (DEF VPR, CLR VPR) Commands

The DEF VPR command defines the voice profile for the specified voice profile number, Figure 6-21. The CLR VPR command clears the defined voice profile for the specified voice profile number.

Commands:

[NOD xxxx] DEF VPR vp
[NOD xxxx] CLR VPR vp

where: vp = voice profile number (1-64)

The voice profile specifies the speed, echo canceler, echo tail length, center clipper, tone generation, single frequency signaling, and fax requirement for the channels associated with the Voice Server Module.

To assign a voice profile to I/O and DS-0 channels, use the DEF CH or DEF DS0 command.

```
N0008>DEF VPR 2
         SPEED      ECH CANL      ECH TAIL      CEN CLIP      TONE DSB
VPROF 02 9.6K-STU   ENABLE        16 MS         ENABLED       OFF

VPROF 02 CON TYP      LOCAL IO    FAX           DELAY         NSF
         LOOP START   FXO         NO            NORMAL        DISABLE

VPROF 02 SF SIG       REC GAIN    XMIT GAIN     TONE MIN      TONE MAX
         NONE         0  DB       0  DB         OFF           OFF
```

SPEED - Compression speed
ECH CANL - Echo canceler
ECH TAIL$^{\Delta}$ - Echo tail length
CEN CLIP - Center clipper
TONE DSB - Tone detection
CON TYP - Connection type
LOCAL IO - Local I/O
FAX - Fax required
FAX DELAY - Fax delay
NSF - Nonstandard fax features
SF SIG - Single frequency signaling
REC GAIN - Receive gain
XMIT GAIN - Transmit gain
TONE MIN - Not currently supported
TONE MAX - Not currently supported

Δ = Fixed at 32 ms for 16K-ATC, 6K-CELP, 8K-CELP, 9.6K-CELP, and 16K-CELP.

Figure 6-21. Typical Define Voice Profile (DEF VPR) Command

Define X.50 Subrate Channel Parameters (DEF XCH) Command

The DEF XCH command displays the current X.50 subrate channel parameters, Figure 6-22, for the specified X.50 subrate channel(s) on the X.50 DS-0 channel(s) of an X.50 Server Module and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF XCH n:ss:cc:sr[-n:ss:cc:sr]...**[**[,n:ss:cc:sr[-n:ss:cc:sr]**]**

where cc = X.50 DS-0 channel number 1-16
sr = X.50 subrate channel number 1-20

NOTES: *The speed and mapping fields cannot be scrolled or defined with the DEF XCH command.*

Before using the DEF XCH command, the SET MAP command must be used to define the speed and mapping parameters.

```
N0129>DEF XCH 1:5:8:1
CONNECT    PROFILE    PRIORITY    DELAYTHR    SPEED    MAPPING
ORIG       DEFAULT    02          07          9600     A

FNS        PHASOR
NONE       MX
```

CONNECT - Originator/terminator of connection
PROFILE - ABM profile (When preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
SPEED - X.50 subrate channel speed (bps)‡
MAPPING - Time slot position within X.50 frame‡
FNS - Mode of transmitting EIA functions
PHASOR - Phasor size (bytes)

‡ **NOTE:** These fields are for display only. Refer to the SET MAP command for configuring these parameters.

Figure 6-22. Typical Define X.50 Subrate Channel Parameters (DEF XCH) Command

After the DEF XCH command is entered, the supervisory port displays the current channel parameters for the specified X.50 subrate channels. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the X.50 Server Module Parameters chapter in the Configuration Planning Manual for parameter values.

Define X.50 DS-0 Channel Parameters (DEF XS0) Command

The DEF XS0 command displays the X.50 DS-0 channel parameters, Figure 6-23, for the specified X.50 DS-0 channel(s) of an X.50 Server Module and allows the user to change parameter values in the database.

Command:

[NOD xxxx] DEF XS0 n:ss:cc[-n:ss:cc]...**[**[,n:ss:cc[-n:ss:cc]**]**

where cc = X.50 DS-0 channel number 1-16

```
N0129>DEF XS0 1:5:7
CONNECT    PROFILE    PRIORITY    DELAYTHR    PROTOCOL    IDLE    FNS
ORIG       DEFAULT    02          07          DIV-2       F1      INBAND

OOS        PHASOR
29         MAX
```

CONNECT - Originator/terminator of connection
PROFILE - ABM profile (When preceded by *, profile is undefined)
PRIORITY - Connect priority level
DELAYTHR - Delay threshold
PROTOCOL - X.50 frame format
IDLE - Idle characters
FNS - Mode of transmitting EIA functions
OOS - Out-of-service timer
PHASOR - Phasor size (bytes)

Figure 6-23. Typical Define X.50 DS-0 Channel Parameters (DEF XS0) Command

NOTE: *Deleting an X.50 DS-0 channel from the database will not result in deleting the associated channels.*

After the DEF XS0 command is entered, the supervisory port displays the current channel parameters for the specified X.50 DS-0 channel. Select new parameters per "Making Menu Selections" paragraph in Chapter 3, General Information. See the X.50 Server Module Parameters chapter in the Configuration Planning Manual for parameter values.

Delete Slot (DEL) Command

The DEL command deletes the database entries for the specified slot(s).

Command:

[NOD xxxx] DEL n:ss[-n:ss]...**[**,n:ss[-n:ss]**]** or *

The DEL command is primarily used when the type of module in a slot is changed. For example, if a Quad Synchronous Module in slot 1:4 is to be replaced by an Interlink Module, the command sequence is:

- DSC CH 1:4:* - Disconnect channels on Quad Synchronous Module in slot 4.
- DEL 1:4 - Delete channel parameters of the Quad Synchronous Module from the database.
- RMV 1:4 - Logically remove Quad Synchronous Module from slot 4.
- Physically remove - Quad Synchronous Module
- Physically insert - Interlink Module
- INS 1:4 - Logically insert Interlink Module into slot 4.
- DEF DL 4 - Define intermachine link parameters for Interlink Module.

Delete Channel (DEL CH) Command

The DEL CH command deletes the database entries for the specified I/O channel(s), DS-0 channel(s), X.50 DS-0 channel(s) or X.50 subrate channel(s).

Command:

[NOD xxxx] DEL CH n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]**
or **{**n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}**

NOTE: *All specified channels and Voice Processor contention channels must be disconnected before the DEL CH command is issued. All specified Quad Synchronous Processor broadcast polling masters and Channelized Services Processor bundle masters must be cleared using the CLR POL and SET CFG /OFF commands before the DEL CH command is issued.*

When all the channels on a module are deleted, the module database is not removed. To remove the module database, issue the DEL command.

Delete Route (DEL RTE) Command

See "Insert and Delete Route (INS RTE, DEL RTE) Commands" paragraph.

Disconnect (DSC) Command

See "Connect and Disconnect Channel (CON *, CON BDL, CON CH, CON DS0, DSC *, DSC BDL, DSC CH, DSC DS0) Commands" paragraph.

Disconnect Bundle (DSC BDL) Command

See "Connect and Disconnect Channel (CON *, CON BDL, CON CH, CON DS0, DSC *, DSC BDL, DSC CH, DSC DS0) Commands" paragraph.

Disconnect Bypass Channel (DSC BP) Command

The DSC BP command temporarily disconnects the specified bypass channel(s). The bypass channel(s) to disconnect can be specified by issuing the command to the originator channel, terminator channel, or bypass channel(s).

Command:

[NOD xxxx] DSC BP **{**Nxxxx n:ss:cc *or* ccc-ccc**}**

where: ccc = bypass channel number (1-511)

Disconnect I/O Channel (DSC CH) Command

See "Connect and Disconnect Channel (CON , CON BDL, CON CH, CON DS0, DSC , DSC BDL, DSC CH, DSC DS0) Commands" paragraph.

Disconnect Channels on Intermachine Link (DSC DL) Command

The DSC DL command disconnects all originator channels connected over the specified intermachine link(s). The command can be limited to disconnect channels with a specified priority level or channels terminating at a specified node. The command can also be expanded to disconnect all originator, terminator, and bypass channels connected over the specified intermachine link(s).

Command:

[NOD xxxx] DSC DL **{*** *or* ss[-ss]...**[**,ss[-ss]**]}**[*option*]

where *option* is one of the following:

/Ppr	=	disconnects channels with connect priority level pr (1-16) only
/Nxxxx	=	disconnects channels terminating at node xxxx only
/A	=	disconnects ALL channels that originate, terminate, or bypass at this node via the specified intermachine link(s)

NOTE: *Channels disconnected when the /A option is used are permanently disconnected; no attempt will be made to reestablish the connections. However, the DSC DL/A command will not permanently disconnect I/O and DS-0 contention channels if the control signal remains.*

For example, to disconnect all channels that originate at node 11 and are connected over link 3, enter:

```
NOD 11 DSC DL 3
```

To disconnect all channels that originate at node 11, are connected over link 3, and have connect priority level 4, enter:

```
NOD 11 DSC DL 3/P4
```

To disconnect all channels that originate at node 11, are connected over link 3, and terminate at node 12, enter:

```
NOD 11 DSC DL 3/N12
```

To disconnect all channels that originate, terminate, or bypass at node 11 via link 3, enter:

```
NOD 11 DSC DL 3/A
```

The DSC DL command can be implemented only at the originator end of a channel unless the /A option is used. Use the DSP CH, DSP MDS0, or DSP DS0 command to determine which end of the channel is the originator.

NOTE: *If a channel is in the process of being connected while the DSC DL command is executed, that channel will NOT be disconnected. After the channel connection is complete, reenter the DSC DL command to disconnect the channel.*

Disconnect DS-0 Channel (DSC DS0) Command

See "Connect and Disconnect Channel (CON *, CON BDL, CON CH, CON DS0, DSC *, DSC BDL, DSC CH, DSC DS0) Commands" paragraph.

Disconnect from Node (DSC ND) Command

See "Connect to Node and Disconnect from Node (CON ND, DSC ND) Commands" paragraph.

Disconnect Broadcast/Polling Group Members (DSC POL) Command

See "Connect and Disconnect Broadcast/Polling Group Members (CON POL, DSC POL) Commands" paragraph.

Disconnect Channels by Priority (DSC PR) Command

See "Connect and Disconnect Channels by Priority (CON PR, DSC PR) Commands" paragraph.

Disconnect Channels by ABM Profile (DSC PRO) Command

See "Connect and Disconnect Channels by ABM Profile (CON PRO, DSC PRO) Commands" paragraph.

Insert and Remove Module (INS, RMV) Commands

The INS command logically inserts a module into a slot. The RMV command logically removes a module from a slot.

NOTE: *The number of Voice Processors, Integrated Trunk Modules, Channelized Services Processors, Voice Server Modules, and X.50 Server Modules that can be installed in a Mainframe is dependent on their combined total. Refer to the "Maximum Number of Voice Server Modules per Mainframe" Table in Chapter 2 of the Configuration Planning Manual for specific number information.*

PRECAUTION: ***Logically removing a Voice Server Module will disconnect all channels supported by that Voice Server Module and place the channels on the retry queue.***

Commands:

[NOD xxxx] INS n:ss[-n:ss]...,n:ss[-n:ss] *or* *
[NOD xxxx] RMV n:ss[-n:ss]...,n:ss[-n:ss]

A module may be physically inserted in a slot, but the LINK/2+ System will not recognize the module unless the INS command is used. Conversely, the RMV command must be used to indicate that a module is no longer inserted in a slot, even when the module has already been physically removed from the slot.

NOTES: *After logically removing a module from a slot using the RMV command, physically remove the module from the slot per the Replacement Procedures chapter in the LINK/2+ Installation and Maintenance Manual.*

The RMV command does not delete the module database parameters. See "Delete Slot (DEL) Command" paragraph.

When nodal security is enabled, the received RMV n:ss command is interpreted as a nonglobal gateway command.

To delete a Channelized Services Processor, Voice Processor, or Integrated Trunk Module once the hardware has been removed, perform the following steps:

- *Disconnect all channels over proprietary bundles (Integrated Trunk Module only).*
- *Disconnect all nonproprietary bundles.*
- *Clear redundancy for both the online and redundant pair.*
- *Delete the appropriate slot.*

At system start-up or after reset of the online Network Module, all modules physically installed will be recognized as logically inserted.

Insert and Delete Route (INS RTE, DEL RTE) Commands

The INS RTE command adds a route (link or bundle and path delay) as an entry into a routing table of a specified node. See the "Define and Clear Routing Table (DEF RTE, CLR RTE) Commands" paragraph for a general discussion of routing table entries.

Command:

[NOD xxxx] INS RTE xxxx p {ss, n:ss, 1:ss:bdl, *or* 1:ss:cc} *delay*

where: *delay* = path delay number, 0 through 7, specifying the minimum number of bypass nodes between the originating and destination nodes.

If the routing table already includes eight entries, this command is rejected.

The path number, p, determines the position of the new route in the list of all available routes to the destination node. In the revised routing table, the new route precedes previously listed routes with the same or higher path number. If the routing table has fewer entries than the specified path number, the new route becomes the last route in the table with the next higher path number.

The DEL RTE command deletes the route with path number p from the routing table to the specified node.

Command:

[NOD xxxx] DEL RTE xxxx p

NOTE: *Before entering a remote command NOD $xxxx_1$ DEL RTE $xxxx_2$ 1 from node $xxxx_2$, make sure that there is another entry in the routing table so that node $xxxx_1$ can continue to communicate with node $xxxx_2$.*

Remove Module (RMV) Command

See "Insert and Remove Module (INS, RMV) Commands" paragraph.

Set Alarm Forwarding (SET ALM FWD) Command

The SET ALM FWD command defines which alarm queue the node will use to trigger the transmission of an "I have an Alarm" message to nodes on this node's remote alarm notification list. See the "Define Alarm Notification List (DEF ALM) Command" paragraph for information on defining the alarm notification list.

Command:

[NOD xxxx] SET ALM FWD {AQ *or* TAQ}

where:

AQ	=	forwards "I have an Alarm" message when any alarms are logged in the AQ alarm queue
TAQ	=	forwards "I have an Alarm" message when any alarms are logged in the TAQ alarm queue

The system monitors both the AQ and TAQ alarm queues every 10 minutes. Depending on which queue has been selected by the SET ALM FWD command, if any alarms are present in the queue, the "I have an Alarm" message is generated. Also, if a new alarm occurs, the "I have an Alarm" message is immediately generated.

If the network management system polls alarms using the TAQ alarm queue, select TAQ. Otherwise, select AQ.

Set Bias Routing for X.50 Subrate Channel (SET BIAS XCH) Command

The SET BIAS XCH command defines the bias route over which an X.50 subrate channel (s) will be connected to a remote node.

Command:

[NOD xxxx] SET BIAS XCH n:ss:cc:sr[-n:ss:cc:sr]/*routing*

where *routing* is one of the following:

Lss[:cc]	=	the intermachine link number and bundle number (optional) to which all channels in the specified range of channels will bias
Lss[:cc]/O	=	only the odd-numbered channels within the specified range of channel numbers will bias to the intermachine link and bundle number (optional) specified in the command
Lss[:cc]/E	=	only the even-numbered channels within the specified range of channel numbers will bias to the intermachine link and bundle number (optional) specified in the command
OFF	=	the specified channels will terminate bias routing

OFF/O = only the odd-numbered channels within the specified range of channel numbers will terminate bias routing

OFF/E = only the even-numbered channels within the specified range of channel numbers will terminate bias routing

If the intermachine link specified in the command is out-of-service, then the next intermachine link in the routing table is selected. Every intermachine link in the routing table is attempted before the biased intermachine link is retried. The channel is not placed on the retry queue until every intermachine link in the routing table is tried once.

If the intermachine link selected in the command is not defined or is not listed in the routing table to the destination node, then the LINK/2+ System will attempt connection over the primary, nonbiased route.

Some applications of bias routing include the following:

- **An alternative to the CON DR command:** The route defined with the DEF BIAS command remains in the database, while the route defined using the CON DR command will be lost if the channel is subsequently disconnected and reconnected.
- **Channel redundancy:** Route two channels with the same destination over two different intermachine links.
- **Route avoidance:** Bias route to ensure that less desirable routes are taken only as a last resort.
- **Load sharing:** Bias routing can be used to distribute channels over several intermachine links. Without bias routing, the primary route is always the first one attempted.

NOTE: *The bias routing parameters are defined for originator channels only.*

Channels must be disconnected before the SET BIAS XCH command is issued. After the command is issued, the channels must be reconnected for the changes to take effect.

Set Bias Routing for X.50 DS-0 Channel (SET BIAS XS0) Command

The SET BIAS XS0 command defines the bias route (first intermachine link) over which the X.50 DS-0 channels on an X.50 Server Module will be connected to a remote node.

Command:

[NOD xxxx] SET BIAS XS0 n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]**/*routing*

where *routing* is one of the following:

Lss[:cc] = the intermachine link number and bundle number (optional) to which all channels in the specified range of channels will bias

Lss[:cc]/O = only the odd-numbered channels within the specified range of channel numbers will bias to the intermachine link and bundle number (optional) specified in the command

Lss[:cc]/E	=	only the even-numbered channels within the specified range of channel numbers will bias to the intermachine link and bundle number (optional) specified in the command
OFF	=	the specified channels will terminate bias routing
OFF/O	=	only the odd-numbered channels within the specified range of channel numbers will terminate bias routing
OFF/E	=	only the even-numbered channels within the specified range of channel numbers will terminate bias routing

If the intermachine link specified in the command is out-of-service, then the next intermachine link in the routing table is selected. Every intermachine link in the routing table is attempted before the biased intermachine link is retried. The channel is not placed on the retry queue until every intermachine link in the routing table is tried once.

If the intermachine link selected in the command is not defined or is not listed in the routing table to the destination node, then the LINK/2+ System will attempt connection over the primary, nonbiased route.

Some applications of bias routing include the following:

- **An alternative to the CON DR command:** The route defined with the SET BIAS command remains in the database, while the route defined using the CON DR command will be lost if the channel is subsequently disconnected and reconnected.
- **Channel redundancy:** Route two X.50 DS-0 channels with the same destination over two different intermachine links.
- **Route avoidance:** Bias route to ensure that less desirable routes are taken only as a last resort.
- **Load sharing:** Bias routing can be used to distribute X.50 DS-0 channels over several intermachine links. Without bias routing, the primary route is always the first one attempted.

NOTE: *The bias routing parameters are defined for originator channels only.*

Channels must be disconnected before the SET BIAS XS0 command is issued. After the command is issued, the channels must be reconnected for the changes to take effect.

Set Bump (SET BMP) Command

The SET BMP command enables or disables end-to-end or point-to-point bumping at a node. The command determines whether an originating channel at a local node, which has an ABM profile authorizing it to be a bumper, will become an active bumper. If bumping is disabled at a local node, a bumper originating at a remote node can still bump a bumpee at the local node.

Command:

[NOD xxxx] SET BMP **{**E *or* P *or* D**}**

where: E = enables end-to-end bumping only
P = enables point-to-point bumping
D = disables bumping

NOTE: *Since end-to-end bumping is less disruptive to a network than point-to-point bumping, end-to-end bumping will always be attempted first, even when point-to-point bumping is enabled.*

Set Bundle Configuration (SET CFG) Command

The SET CFG command defines the bundle configuration for each Integrated Trunk Module and Channelized Services Processor. Each defined DS-0 channel must be configured as a bundle. For bundle sizes greater than 1, each bundle is defined by specifying the master DS-0 channel and each slave DS-0 channel that is a member of the bundle. For a bundle size of 1, the bundle is defined by specifying the defined DS-0 channel as the master channel and the slave channel. After the Integrated Trunk Module or Channelized Services Processor is configured for bundling, issue all subsequent commands to the master DS-0 channel(s).

NOTE: *To make it easier to remember which DS-0 channel is the master DS-0 channel, always make the lowest numbered DS-0 channel of the bundle the master DS-0 channel.*

Commands:

[NOD xxxx] SET CFG n:ss:cc=cc[-cc]...**[**,cc[-cc]**]**[/A]
[NOD xxxx] SET CFG n:ss:cc/OFF

where: cc = specifies each slave DS-0 channel and/or range(s) of DS-0 channels that are members of the bundle
/A = adds specified slave DS-0 channel(s) to an existing bundle
/OFF = clears master channel and all slave DS-0 channels associated with the specified master channel

For example, a Channelized Services Processor in slot 10 of the Control Mainframe, defined for G.732N framing, contains 31 DS-0 channels. These channels can be configured for bundling as follows:

- SET CFG 1:10:3=7,11 has a bundle size of 3 with DS-0 channel 3 as the master channel and DS-0 channels 7 and 11 as the slave channels. The speed of this bundle is 192 kbps. This bundle can be connected to a local or remote Quad Synchronous Processor channel.

- SET CFG 1:10:1=5,9,13,17,21,25,29 has a bundle size of 8 with DS-0 channel 1 as the master channel and DS-0 channels 5, 9, 13, 17, 21, 25, and 29 as the slave channels. The speed of this bundle is 512 kbps. This bundle can be connected to a local Dual Synchronous Module channel.

- SET CFG 1:10:2=4,6,8,10,12,14,16,18,20,22,24 has a bun dle size of 12 with DS-0 channel 2 as the master channel and DS-0 channels 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24 as the slave channels. The speed of this bundle is 768 kbps. This bundle can be connected to a remote Channelized Services Processor bundle.

- SET CFG 1:10:15=19, 23, 26, 27, 28 has a bundle size of 6 with DS-0 channel 15 as the master channel and DS-0 channels 19, 23, 26, 27, and 28 as the slave channels. The speed of this bundle is 384 kbps. This bundle can be connected to a local Channelized Services Processor.

- SET CFG 1:10:30=30 has a bundle size of 1 with DS-0 channel 30 as the master channel. The speed of this channel is 64 kbps. This bundle can be connected to a local or remote Voice Processor.

- SET CFG 1:10:31=31 has a bundle size of 1 with DS-0 channel 31 as the master channel. The speed of this channel is 64 kbps. This bundle can be connected to a local or remote Subrate Channel Processor.

- SET CFG 1:10:3/OFF clears master channel 3 and all slave DS-0 channels, channels 7 and 11, associated with master DS-0 channel 3.

- SET CFG 1:10:2 = 16/A adds DS-0 channel 16 as a member of the bundle with master channel 1:10:2.

NOTES: *If the Integrated Trunk Module or Channelized Services Processor is defined for G.732S framing, DS-0 channel 16 cannot be used.*

Channels must be disconnected before the SET CFG command is issued. After the command is issued, the channels must be reconnected for the changes to take effect.

Follow the steps listed below when defining a bundle:

- Clear bundle configuration — SET CFG n:ss:c/OFF
- Set bundle configuration — SET CFG n:ss:cc = cc-cc
- Define bundle parameters — DEF BDL PR or DEF BDL NPR

Assign ABM Profile to Channels (SET CH) Command

The SET CH command assigns the specified ABM profile to I/O, DS-0, X.50 DS-0, or X.50 subrate channels within a specified range.

Command:

[NOD xxxx] SET CH **{**n:ss:c-n:ss:c *or* n:ss:cc-n:ss:cc**}{**/Pppp**}**

where: n:ss:c = I/O channel
n:ss:cc = DS-0 channel
ppp = ABM profile (1-250 or D for default)

Set Clock (SET CLK) Command

The SET CLK command directs the LINK/2+ System to use one of the clocks listed on the clock fallback list as the system clock source.

Command:

[NOD xxxx] SET CLK **{**1 *or* 2 *or* 3**}**

where: 1 = clock fallback 1 (primary) source
2 = clock fallback 2 source
3 = clock fallback 3 source

NOTE: *If the clock fallback source selected is defined as a SKP clock source, the command is rejected.*

PRECAUTION: ***Using this command on an active network may result in information loss during clock switchover.***

See "Define System Clock Fallback List (DEF CFB) Command" paragraph for information on selecting clock sources.

Set Clock Qualification Tolerance Level (SET CQT) Command

The SET CQT command sets the permissible frequency range for the nodal timing source (for NCL+ and NCL* Network Modules only).

Command:

[NOD xxxx] SET CQT **{**LO *or* HI**}**

For NCL+: LO = sets the qualification frequency range for the nodal timing source to a long-term frequency deviation from +22 parts per million (ppm) from nominal to -26 ppm from nominal.
HI = sets the qualification frequency range for the nodal timing source to a long-term frequency deviation from +45 ppm from nominal to -53 ppm from nominal.

For NCL*: LO = sets the qualification frequency range for the nodal timing source to a long-term frequency deviation of ±10 ppm from nominal

HI = sets the qualification frequency range for the nodal timing source to a long-term frequency deviation of ±32 ppm from nominal

For example, to set the clock qualification tolerance level to low for master clocking node 28, enter:

```
NOD 28 SET CQT LO
```

Use the DSP ST CLK command to display the current clock qualification tolerance level.

Set Clock Switching (SET CSW QS, SET CSW SS) Commands

The SET CSW QS command sets an interval of 17 seconds as the maximum time allowed for the LINK/2+ System to qualify and start locking to an alternate clock source. These commands apply to the Enhanced Digital PLL only.

Command:

[NOD xxxx] SET CSW QS

The SET CSW SS command allows the LINK/2+ System to qualify and start locking to an alternate clock source within 30 seconds.

Command:

[NOD xxxx] SET CSW SS

Use the DSP ST CLK command to display the current clock switching time interval.

Set Contention (SET CTN) Command

The SET CTN command enables or disables dynamic bandwidth allocation on a call demand basis to Voice Processor DS-0 channels programmed for contention. Contending DS-0 channels are monitored for off-hook and are allocated bandwidth, if available, and placed in the connected state. The allocated bandwidth is returned to the bandwidth pool when the call originator goes on-hook. The command can also be used to force connections between DS-0 contention channels that are not busied out.

Command:

[NOD xxxx] SET CTN **{**E *or* D *or* C**}**

where: E = enables DS-0 contention
D = disables DS-0 contention
C = connects DS-0 contention channels that are not busied out. The connect request is issued from the lower node.

Set Backup Link (SET DL BCK) Command

The SET DL BCK command defines or cancels the proprietary bundle on an Integrated Trunk Module that backs up the intermachine link of an Interlink Module or another proprietary bundle of an Integrated Trunk Module. The SET DL BCK command takes effect immediately. It is not necessary to reset the module to redesignate a backup bundle.

Command:

[NOD xxxx] SET DL BCK **{***or* ss *or* 1:ss *or* 1:ss:cc**}**X**{**1:ss:cc *or* OFF *or* C**}**

where: X = a delimiter (/, =, or a blank)

For example, to back up the Interlink Module in slot 15 with bundle 1 of the Integrated Trunk Module in slot 10, enter:

```
SET DL BCK 1:15=1:10:1
```

To cancel all backup bundles at a node, enter:

```
SET DL BCK */C
```

The options C and OFF have the same effect of canceling the backup.

To back up all appropriate intermachine links and proprietary bundles at a node with bundle 3 of the Integrated Trunk Module in slot 10, enter:

```
SET DL BCK *=1:10:3
```

When the LINKBCK field is blanked on the supervisory terminal, the SET DL BCK command is still accepted, but the field remains blanked.

Set Expansion Link (SET DL EXP) Command

The SET DL EXP command defines or cancels the proprietary bundle on an Integrated Trunk Module that can be used as an expansion link for the intermachine link of an Interlink Module or for another proprietary bundle of an Integrated Trunk Module. The SET DL EXP command takes effect immediately. It is not necessary to reset the module to redesignate an expansion bundle.

Command:

[NOD xxxx SET DL EXP **{****or* ss *or* 1:ss *or* 1:ss:cc**}**X**{**1:ss:cc *or* OFF *or* C**}**

where: X = a delimiter (/, =, or a blank)

For example, to set bundle 1 of the Integrated Trunk Module in slot 10 as the expansion link for the Interlink Module in slot 15, enter:

```
SET DL EXP 1:15=1:10:1
```

To cancel all expansion bundles at a node, enter:

```
SET DL EXP */C
```

The options C and OFF have the same effect of canceling the expansion link.

To set bundle 3 of the Integrated Trunk Module in slot 10 as the expansion bundle for all appropriate intermachine links and proprietary bundles at a node, enter:

```
SET DL EXP *=1:10:3
```

When the LINK EXP field is blanked on the supervisory terminal, the SET DL EXP command is still accepted, but the field remains blanked.

Set Dial-Up Retry (SET DRT) Command

The SET DRT command defines the maximum number of redialing attempts for an ISDN or Switched 56K connection if the dialed number is busy or not reachable. The command is effective at the next channel connection.

Command:

[NOD xxxx] SET DRT rt

where: rt = retries (0-63)

For example, to define 2 as the maximum number of dialing attempts for an ISDN connection, enter:

SET DRT 2

Use the DSP SY command to display the dial retry value.

Set Dial-Up Timer (SET DTM) Command

The SET DTM command defines delay between dialing retries in 30-second intervals for an ISDN or Switched 56K connection attempt. The command is effective at the next channel connection.

Command:

[NOD xxxx] SET DTM tmo

where: tmo = timeout value in 30-second intervals (1-255)

For example, if a 2-minute delay between dialing attempts for an ISDN connection is desirable, define 4 (4 x 30 seconds = 2 minutes) as the timeout value and enter:

SET DTM 4

Use the DSP SY command to display the dial timer value.

Set Grooming Flag and Grooming Time (SET GRM) Commands

The SET GRM commands are used to:

- Set the system grooming flag, i.e., enable or disable grooming
- Set the grooming day(s) and time(s) on a system basis

Commands:

[NOD xxxx] SET GRM **{**E *or* D**}**

where: E = enables system grooming
D = disables system grooming

[NOD xxxx] SET GRM *day* $time_1$ $time_2$

where: *day* = SUN, MON, TUE, WED, THU, FRI, SAT, or * for every day of the week
$time_1$ = grooming disconnect time (hours:minutes), or C to clear disconnect time
$time_2$ = grooming reconnect time (hours:minutes), or C to clear reconnect time

Figure 6-24 shows an example of using the SET GRM command to set the grooming time.

Note the following guidelines for setting grooming times:

- Entering a time greater than 23:59 for either disconnect or reconnect time is invalid.
- Both disconnect and reconnect times must be entered to set the grooming times.
- If the interval between disconnect and reconnect times is greater than 15 minutes, a warning flag (*) will precede the day of the week in the grooming time-table display, Figure 6-26.
- If the disconnect time is greater than the reconnect time, a warning message will follow the grooming time-table display, Figure 6-24.
- If the disconnect and reconnect times are set equal, reconnection will immediately follow the disconnect.

```
N0001>SET GRM MON 01:20 02:50
                   *SUN     *MON     TUE     WED     THU     *FRI     *SAT
GROOM DISC TIME:   10:15    01:20    ***     ***     ***     09:30    14:40
GROOM RCON TIME:   20:40    02:50   05:00    ***    03:00    23:50    20:40
* RECON TIME IS MORE THAN 15 MINUTES LATER THAN DISC TIME!
  GROOMING IS CURRENTLY ENABLED

N0001>SET GRM * c 22:00
                    SUN      MON     TUE     WED     THU      FRI      SAT
GROOM DISC TIME:    ***      ***     ***     ***     ***      ***      ***
GROOM RCON TIME:   22:00    22:00   22:00   22:00   22:00    22:00    22:00
  GROOMING IS CURRENTLY DISABLED
```

Parameters are changed via menu selection:
SUN - SAT - Day of week
01:20 - Disconnect time
02:50 - Reconnect time

RECON TIME IS MORE THAN 15 MINUTES Warning Message **-** (*Precedes days in grooming time table where this occurs)
GROOMING IS CURRENTLY ENABLED - Current grooming status

Figure 6-24. Typical Set Groom (SET GRM) Command Displays

For a channel to be groomed, the following conditions must be in effect:

- Channel's ABM profile is enabled for grooming and system grooming is enabled.
- Channel is the originator.

- Channel's current path delay is greater than the shortest path delay defined in the routing table for its destination node.

- When bias routing is selected, the channel is groomed:

  - If the channel is not connected over its bias route

  - If the channel is connected over its bias route but the actual path delay is greater than the shortest path delay defined in the routing table

In addition, channels that were connected in override will be groomed.

If a channel is a local connection channel, contention channel, or directly connected channel, the channel will not be groomed.

A channel will be reconnected when the grooming reconnect time is reached.

For backup and expansion bundles with grooming enabled, the bundle connection will terminate at grooming disconnect time if and only if the intermachine link being backed up has come back in service.

Set and Clear Remote Node Gateway (SET GWY, CLR GWY) Commands

The SET GWY command designates the specified remote node supervisory port or supervisory computer port as a gateway. The CLR GWY command clears the gateway status. Gateway status is initially determined by Network Module DIP switch but can be changed by the SET GWY or CLR GWY command.

Commands:

NOD xxxx SET GWY **{**CP *or* SP**}**
NOD xxxx CLR GWY **{**CP *or* SP**}**

where: CP = supervisory computer port
SP = supervisory port

NOTE: *When the Network Module is reset, the gateway status determined by Network Module DIP switch takes effect, overriding any previous SET GWY or CLR GWY command. See Network Module chapter in the LINK/2+ Installation and Maintenance Manual for Network Module DIP switch settings.*

Set QAM I/O Error Character (SET IO) Command

The SET IO command determines the ASCII character that the LINK/2+ System uses to indicate a parity error in the data stream of a QAM Module.

Command:

[NOD xxxx] SET IO *hh*

where: *hh* = the hexadecimal equivalent of the ASCII character (00 to FF)

Set Password Level 1 CON/DSC (SET L1C) Command

The SET L1C command allows or prohibits users with password level 1 to use the CON and DSC commands. The SET L1C command can be issued by a level 2 user only. If passwords have been defined, the DSP SY command response indicates the current status (enabled or disabled).

Command:

[NOD xxxx] SET L1C {D *or* E}

where:
- D = prohibits all password level 1 users from issuing CON BDL, CON CH, CON DS0, DSC BDL, DSC CH, and DSC DS0 commands
- E = allows all password level 1 users to issue CON BDL, CON CH, CON DS0, DSC BDL, DSC CH, and DSC DS0 commands

Set Map (SET MAP) Command

The SET MAP command defines the speed and time slot (s) for the specified X.50 subrate channel (s) on the X.50 Server Module.

Commands:

[NOD xxxx] SET MAP n:ss:cc:sr /*speed* = *timeslot*

This command defines the speed and timeslot of a **single** subrate channel on the specified X.50 Server Module.

where:
- cc = X.50 DS-0 channel (1-16)
- sr = X.50 subrate channel (1-20)
- *speed* = speed in bps of subrate channel
- *timeslot* = X.50 time slot that this subrate channel will occupy

For example, to define the speed and time slot for subrate channel 2 of X.50 DS-0 channel 8 on the X.50 Server Module located in slot 7 of Mainframe 1, enter:

```
SET MAP 1:7:8:2 /4800=B1
```

This example defines the speed for this subrate channel as 4800 bps and assigns the channel to time slots B1 and B3.

[NOD xxxx] SET MAP n:ss:*/F*speed*

This command assigns the **same** speed to **all** subrate channels on the specified X.50 Server Module.

where:
- * = all X.50 DS-0 channels
- /F = fill all timeslots with defined speed
- *speed* = speed in bps (2400, 4800, or 9600)

For example:

SET MAP 2:14:*/F2400 sets all subrate channels (320) of X.50 Server Module located in slot 14 of Mainframe 2 to a speed of 2400 bps.

SET MAP 2:14:*/F4800 sets all subrate channels (160) of X.50 Server Module located in slot 14 of Mainframe 2 to a speed of 4800 bps.

SET MAP 2:14:*/F9600 sets all subrate channels (80) of X.50 Server Module located in slot 14 of Mainframe 2 to a speed of 9600 bps.

The selected speed and time slots for X.50 subrate channels can by displayed using the DSP XCH command.

Set Phone Numbers (SET PHN BCK, SET PHN XDL) Commands

The SET PHN BCK and SET PHN XDL commands enter the user's ISDN or Switched 56K phone numbers into directories for the specified Interlink Module or Integrated Trunk Module. The directories are used for dial-up services. The SET PHN BCK command establishes the directory of phone numbers used for the dial-up service link backup feature used by the Integrated Trunk Module and Interlink Module. The SET PHN XDL command establishes the directory of phone numbers used for the dial-up service link expansion and dial link features used only by the Integrated Trunk Module.

Commands:

[NOD xxxx] SET PHN BCK {1:ss:cc=phn[/D *or* /I][/H0] *or* 1:ss:cc[/C][/H0] *or* 1:ss:*/C}

[NOD xxxx] SET PHN XDL {1:ss:cc=phn[/D *or* /I][/H0] *or* 1:ss:cc[/C][/H0] *or* 1:ss:*/C}

where: phn = ISDN or Switched 56K phone number up to 16 characters (0 through 9, *, #, :, -). The hyphen (-) is used for clarity only. For ISDN applications, the colon (:) can be used only once to indicate that the following characters are a network sub-party address. The asterisk (*) and pound sign (#) are used with ISDN applications only. ISDN applications may use up to 20 characters.

/D = Domestic (default)

/I = International

/C = Clears phone number(s)

/H0 = H0-channel

NOTE: *The * can be used to specify all channels of a module only when the /C option is used.*

For example, to define the phone number 1-201-555-6000 as the link backup phone number for channel 12, enter:

SET PHN BCK 1:5:12=1-201-555-6000

Use the DSP PHN BCK or DSP PHN XDL command to display all the phone numbers listed for the specified directory.

Change ABM Profile Parameter (SET PRO) Commands

The SET PRO commands are used to modify parameters within existing ABM profiles.

The general command format is:

Command:

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/*parameter=value*

where: ppp = ABM profile (1-250)
* = all defined ABM profiles

The SET PRO commands can modify the following *parameters*:

ENC = encryption parameter
SDT = satellite threshold parameter
EPR = link error performance parameter
GRP = link group parameter
GRM = grooming parameter
BMP = bumping state parameter
BLV = bumping level parameter
OVR = override parameter

The formats for modifying each parameter value are shown below.

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/ENC= **{**D,R**}**

where: ENC = encryption parameter
D = disable
R = required

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/SDT= **{**0,1,2,3,4,5,6,D**}**

where: SDT = satellite threshold parameter
0-6 = number of satellite hops
D = don't care

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/EPR= **{**D,V,G,F**}**

where: EPR = link error performance parameter
D = don't care
V = very good
G = good
F = fair

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/GRP= **{**D,1,2,3,4,5,6,7**}**

where: GRP = link group parameter
D = don't care
1-7 = group number

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/GRM= **{**D,E**}**

where: GRM = grooming parameter
D = disable
E = enable

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/BMP= **{**D,E,R,B**}**

where: BMP = bumping state parameter
D = disable
E = bumpee
R = bumper
B = both

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/BLV= **{**1,2,3,4**}**

where: BLV = bumping level parameter
1-4 = level

[NOD xxxx] SET PRO **{*** *or* ppp[-ppp]...**[**,ppp[-ppp]**]}**/OVR= **{**D,E**}**

where: OVR = override parameter
D = disable
E = enable

Set and Clear Redundant Module (SET RDN, CLR RDN) Commands

The SET RDN command sets the redundancy logic between a pair of associated Interlink Modules, Integrated Trunk Modules, Channelized Services Processors, D-Channel Modules, or Voice Processors. The SET RDN command also copies intermachine link parameter values from one Interlink Module to the other, or DS-1/DS-0 parameter values from one Voice Processor, Integrated Trunk Module, or Channelized Services Processor to the other. The CLR RDN command clears the redundancy logic between the pair, but does not affect parameter values. Either command resets both modules of a redundant pair.

Commands:

[NOD xxxx] SET RDN [n:]ss
[NOD xxxx] CLR RDN [n:]ss

Redundant operation is possible only if the two modules are of the same type and are inserted into adjacent slots with the left-most module occupying an odd-numbered slot. The **ss** specified in the command is the slot number of the module containing the desired parameter values.

NOTE: *If a remote SET RDN or CLR RDN command is sent to a node that targets the only datalink (i.e. route) back to the issuing node the prompt character of the supervisory port will not return to the display. Enter a Control-C character to terminate the command and return the prompt character to the display. The SET RDN command does not copy the LFM SLOT and LFM BNDL parameter fields of an Interlink Module database.*

To initially configure a redundant pair of modules, perform the following:

- Ensure that the two modules are adjacent to each other and that the left-most module is in an odd-numbered slot.
- Using the appropriate command, define the parameter values for one of the modules of the redundant pair.
- Issue the SET RDN command, specifying the value for **ss** as the slot number of the module containing the desired parameter values.

For example, to ensure that the redundant module in slot 4 has the same parameter values as the module in slot 3, enter:

SET RDN 1:3 Sets the redundancy logic and copies the parameter values of the module in slot 3 to the module in slot 4. Thereafter, if the online module fails, the redundant module will take control to maintain service.

NOTE: *It is recommended that channels on Voice Processors or Channelized Services Processors be disconnected before issuing a SET RDN command. In addition, if Voice Processors or Channelized Services Processors have channels in queue waiting to be connected when the SET RDN command is issued, the command is aborted and the message "CHANNEL(S) QUEUED, CMD ABORTED" is displayed. The operator should wait for the connections to be completed before proceeding.*

The CLR RDN command clears the redundancy logic but does **not** affect the parameter values in either module. If the command is issued to either of the modules in a redundant pair that have been properly configured for redundant operation, the online module will continue normal operation but, if that module fails, the redundant module will not take control.

For example:

CLR RDN 1:3
or
CLR RDN 1:4

Clears the redundancy logic between the modules in slots 3 and 4. Thereafter, if the online module fails, the redundant module will **not** take control to maintain service.

Set System Connect Retry Timer (SET RET) Command

See "Define System Connect Retry Timer (DEF RET) Command" paragraph.

Set and Clear Nodal Security (SET SEC, CLR SEC) Commands

The SET SEC command enables nodal security and restricts a node from accepting global gateway commands. When nodal security is enabled, all global gateway commands are interpreted by the node as nonglobal commands and are accepted only if both:

- The supervisory port or supervisory computer port originating the command is designated a gateway.
- The node number of the node originating the command is on the alarm notification list of the node receiving the command.

The CLR SEC command disables nodal security and allows the node to accept global gateway commands from any gateway node.

Commands:

[NOD xxxx] SET SEC
[NOD xxxx] CLR SEC

Use the DSP SY command to determine if nodal security is enabled or disabled.

Set Link Framing Module Time Slots (SET TSA and SET TSB) Commands

The SET TSA and SET TSB commands establish the active time slots on the Link Framing Module (Models LFM.10, LFM.11, and LFM.12) and determine the time slots that make up bundles A and B on the connected trunk(s).

The number of assigned time slots in bundles A and B must match the speeds assigned with the DEF LFM command. If the DEF LFM command sets the Link Framing Module to two-to-one mode, the time slots for bundles A and B cannot overlap.

Commands:

[NOD xxxx] SET TSA n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**=cc[-cc]...**[**,cc[-cc]**]**

[NOD xxxx] SET TSA n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**/OFF

[NOD xxxx] SET TSB n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**=cc[-cc]...**[**,cc[-cc]**]**

[NOD xxxx] SET TSB n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**/OFF

where: /OFF = clears all time slot assignments for the bundle

For example, to set time slots 1 through 12 and 13 through 24 as active for the local LFM.12 module in slot 9 of nest 1, enter:

SET TSA 1:9=1-12

SET TSB 1:9=13-24

NOTE: *The SET TSA and SET TSB commands enter the new active time slots parameters to take effect, the Link Framing Module(s) must be reset.*

Set Voice Server Module (SET VSM) Command

The SET VSM command defines the specified module(s) as a Voice Server Module.

Command:

[NOD xxxx] SET VSM n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**

Set X.50 Server Module (SET XSM) Command

The SET XSM command defines the specified module(s) as a primary or redundant X.50 Server Module.

Command:

[NOD xxxx] SET XSM n:ss[-n:ss]...**[**,n:ss[-n:ss]**] [**/R**]**

where /R = redundant module

Chapter 7

Diagnostic Commands

The following diagnostics can be performed from a supervisory terminal:

- **Loopback Tests:** Isolate problem to a specific location on:

  - an I/O module

  - an intermachine link

  - a DS-0 channel or DS-1 trunk

  - bypass channel

  - a D-channel

  - a V-channel (channel processed by the Voice Server Module)

  - an X.50 DS-0 channel or subrate channel

- **Internal Test Generator:** Provides test message or control functions on I/O module channels for loopback tests.

- **Internal Tone Generator:** Provides milliwatt reference equivalent test tone on DS-0 channels for loopback tests.

- **Reset Commands:** Check module operation including Driver Modules and Power Supply Modules.

- **Alarm Relays:** Test alarm relays.

- **Monitoring Channel Data:** Continuous monitoring of I/O channel data.

- **Phasors:** Center bypass and channel phasors.

Table 7-1 lists the supervisory port diagnostic commands in alphabetical order by command mnemonic.

Many supervisory port display commands are also useful when performing diagnostics. See Chapter 5, Display Commands, for a description of these commands.

The Troubleshooting chapter in the LINK/2+ Installation and Maintenance Manual also includes information on performing diagnostics.

Table 7-1. Diagnostic Commands

G	N	Command
G	#	BSY {* *or* n:ss:cc[-n:ss:cc] … [,n:ss:cc[-n:ss:cc]]}[{/mmm *or* /P}] **Description:** Places specified DS-0 channel(s) in a busy state.
G	#	CEN PHS {* *or* n:ss:cc[-n:ss:cc] …[,n:ss:cc[-n:ss:cc]]} **Description:** Centers phasor(s) of specified Voice Processor DS-0 channel(s).
G	#	CLR BP LP {* *or* ccc[-ccc] …[,ccc[-ccc]] *or* 1:ss:ccc[-1:ss:ccc] …[,1:ss:ccc[-1:ss:ccc]]} **Description:** Clears bypass channel loopback on specified bypass channel(s).
G	#	CLR BP PH {* *or* ccc[-ccc] …[,ccc[-ccc]] *or* 1:ss:ccc[-1:ss:ccc] …[,1:ss:ccc[-1:ss:ccc]]} **Description:** Centers both phasors on specified bypass channel(s).
G	#	CLR CH {* *or* n:ss:c[-n:ss:c] …[,n:ss:c[-n:ss:c]]} **Description:** Clears I/O module channel(s) of any I/O module loopback or any associated V-channel loopback(s) that may exist.
G	#	CLR DL {* *or* ss[-ss] …[,ss[-ss]]} **Description:** Clears intermachine link associated with Interlink Module in slot ss of any loop.
G	#	CLR DS0 {* *or* n:ss:cc[-n:ss:cc] …[,n:ss:cc[-n:ss:cc]]} **Description:** Clears specified DS-0 channel(s) of any loopback or any associated D-channel or V-channel loopback(s) that may exist. When command is issued to a member of a bundle, clears all associated members of the DS-0 bundle in loopbacks. Does not center the phasor(s).
G	#	CLR DS1 {* *or* n:ss[-n:ss] …[,n:ss[-n:ss]]} **Description:** Clears DS-1 trunk on specified Integrated Trunk Module(s), Voice Processor(s), or Channelized Services Processor(s) of any DS-1 or network interface loop. Resets out-of-frame counter.
G	#	CLR LCL {* *or* n:ss:cc[-n:ss:cc] …[,n:ss:cc[-n:ss:cc]]} **Description:** Clears specified local DS-0 channel(s) or bundled channels of specified master from loopback or busy out; DS-0 channel(s) at the remote end are unaffected.
G	#	CLR LFM {* *or* n:ss[-n:ss]...[,n:ss[-n:ss]]} **Description:** Clears LFM.14 Link Framing Module line driver (high speed port) from loopback.
G	#	CLR MG **Description:** Stops internal test message generator and clears internal test detector. Removes I/O channel from monitor mode.

Table 7-1. Diagnostic Commands (Cont'd)

G	N	Command
G	#	CLR PH {* *or* n:ss:c[-n:ss:c] …[,n:ss:c[-n:ss:c]]} **Description:** Centers phasor of specified I/O module channel(s).
G	#	CLR RLY **Description:** Stops relay test.
G	#	CLR TON {* *or* n:ss:cc[-n:ss:cc] …[,n:ss:cc[-n:ss:cc]]} **Description:** Stops test tone generator on specified DS-0 channel(s).
G	#	LP BP {* *or* ccc[-ccc]…[,ccc[-ccc]] *or* 1:ss:ccc[-1:ss:ccc] …[,1:ss:ccc[-1:ss:ccc]]} **Description:** Places specified bypass channel(s) in bidirectional loopback.
G	#	LP *loopback* CH {* *or* n:ss:c[-n:ss:c] … [,n:ss:c[-n:ss:c]]}[{/I *or* /O}][*speed*][/P] **Description:** Places specified I/O module channel(s) in analog, digital, or bus loopback, where *loopback* is one of the following: LB = bidirectional bus loopback RB = bidirectional bus loopback LP = parallel bidirectional loopback of Quad Synchronous Processor channels only LS = serial bidirectional loopback of Quad Synchronous Processor or Isochronous Communication Module channels only LD = local modem local digital loopback for data channels; bidirectional channel controller loopback for Quad Voice Module and Enhanced Voice Module channels only LA = local modem local analog loopback for data channels; codec loopback for Quad Voice Module and Enhanced Voice Module channels only RA = remote modem remote analog loopback RD = remote modem remote digital loopback VS = used with channels serviced by a Voice Server Module. Places associated V-channel in bidirectional loopback. ***NOTE:*** */P is a* ***required*** *modifier that is used with VS loopback only.* Optional modifiers /I and /O are used with asymmetrical channels only: /I = runs loopback using input speed. Default loopback speed is /I. /O = runs loopback using output speed. *Speed* is an optional modifier used to alter the nominal test speeds of isochronous communication loopback testing: /F = faster than nominal communication speed /S = slower than nominal communication speed /R = equal to nominal communication speed ***NOTE****: /F, /S, /R options are used with Isochronous Communication Module and Dual Isochronous Module only.*

Table 7-1. Diagnostic Commands (Cont'd)

G	N	Command
G	#	LP *loopback* DL {* *or* ss[-ss]…[,ss[-ss]]} [{/R *or* /T}][{/mm *or* /P}] **Description:** Places intermachine link associated with Interlink Module specified by slot ss in analog, digital, or bus loopback, where *loopback* is one of the following: LB = local Interlink Module bus loopback LD = local line driver local digital loopback LA = local line driver local analog loopback; local buffer local analog loopback for LFM.14 Link Framing Module RA = remote line driver remote analog loopback RD = remote line driver remote digital loopback; remote buffer remote digital loopback for LFM.14 Link Framing Module RB = remote Interlink Module bus loopback ***NOTE**: RA, RD, and RB cannot be performed on asymmetrical/simplex links. The /P (permanent) modifier cannot be used for loopbacks issued to a remote node.* Optional modifiers /R and /T are used with asymmetrical links only: /R = runs loopback using received speed. Default loopback speed is /R. /T = runs loopback using transmit speed.
G	#	LP DS0 *loopback* {* *or* n:ss:cc[-n:ss:cc]… [,n:ss:cc[-n:ss:cc]]}[{/mmm *or* /P}] **Description:** Places specified DS-0 channel(s) or associated bundled DS-0 channels for specified master in equipment, local, or bidirectional loopback, where *loopback* is one of the following: EQ = channel phasor loopback toward the DS-1 (or E-1) trunk, i.e., toward the external equipment LI = channel phasor loopback toward an Interlink Module, I/O module, Voice Processor, Integrated Trunk Module, or Channelized Services Processor via the system bus, i.e., toward the LINK network BI = channel phasor bidirectional loopback VS = used with channels serviced by a Voice Server Module. Places associated V-channel in bidirectional loopback. RA = remote analog loopback of remote line driver of the remote Interlink Module RB = remote Integrated Trunk Module bus loopback RD = remote digital loopback of remote line driver of the remote Interlink Module ***NOTE**: The /mmm option does not apply to VS loopbacks. The /P option, however, is a **required** modifier for VS loopbacks.*
G	#	LP DS1 *loopback* {* *or* n:ss[-n:ss]… [,n:ss[-n:ss]]}[{/mmm *or* /P}] **Description:** Places DS-1 (or E-1) interface(s) on specified Integrated Trunk Module(s), Voice Processor(s), or Channelized Services Processor(s) in equipment, local, or bidirectional loopback, where *loopback* is one of the following: EQ = loopback toward the DS-1 (or E-1) trunk, i.e., toward the external equipment LI = loopback away from the DS-1 (or E-1) trunk, i.e., toward the LINK network BI = bidirectional DS-1 (or E-1) interface loopback

Table 7-1. Diagnostic Commands (Cont'd)

G	N	Command
G	#	LP LFM *loopback* {* *or* n:ss[-n:ss]... [,n:ss[-n:ss]]}[{/mm *or* /P}] **Description:** Places in loopback all intermachine links associated with LFM.14 Link Framing Module(s), where *loopback* is one of the following: LK = loopback at line driver toward Link Framing Module LLB = loopback at line driver toward the JT-2 trunk
G	#	LP NI *loopback* {* *or* n:ss[-n:ss]… [,n:ss[-n:ss]]}[{/mmm *or* /P}] **Description:** Places DS-1 (or E-1) trunk(s) on specified Integrated Trunk Module(s), Voice Processor(s), or Channelized Services Processor(s) in loopback at the line driver, i.e., Bipolar Interface Module, Digital Termination Module, or Link Framing Module, where *loopback* is one of the following: LK = loopback at line driver toward the Integrated Trunk Module, Voice Processor, or Channelized Services Processor; loopback at local buffer toward local Integrated Trunk Module for LFM.14 Link Framing Module LLB = loopback at line driver toward the DS-1 (or E-1) trunk; loopback at local buffer toward JT-2 trunk for LFM.14 Link Framing Module
G	#	LP XCH {n:ss:cc:sr[-n:ss:cc:sr]... [,n:ss:cc:sr[-n:ss:cc:sr]]}[{/mmm *or* /P}] **Description:** Loops the designated subrate channel(s) phasor data on the specified X.50 Server Module back towards the low speed side, and the subrate channel(s) processed phasor data back toward the associated X.50 DS-0 channel. All other subrate channels supported by that X.50 DS-0 channel are unaffected.
G	#	LP XS0 {n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]}[{/mmm *or* /P}] **Description:** Places the specified X.50 DS-0 channel(s) in bidirectional loopback. The aggregate data is looped toward the X.50 network at the phasor and all of the subrate channels supported by the X.50 DS-0 channel(s) are looped towards the low speed outputs. All other X.50 DS-0 channels supported by that X.50 Server Module are unaffected.
G	#	MON {L *or* R} n_1:ss_1:c_1,n_2:ss_2:c_2 *or* {L *or* R} {n_1:ss_1:cc_1,n_2:ss_2:cc_2 *or* n_1:ss_1:cc_1,n_2:ss_2:c_2} *or* {L *or* R} {n_1:ss_1:cc_1:sr_1,n_2:ss_2:cc_2:sr_2 *or* n_1:ss_1:cc_1:sr_1,n_2:ss_2:c_2} **Description:** Monitors I/O module, X.50 DS-0, or X.50 subrate channel data, where: L = data sent from local channel c_1 (or cc_1, or sr_1) is monitored on local channel c_2 (or cc_2, or sr_2). R = data received by local channel c_1 (or cc_1, or sr_1) is monitored on local channel c_2 (or cc_2, or sr_2).

Table 7-1. Diagnostic Commands (Cont'd)

G	N	Command
G	#	RST n:ss[-n:ss]…[,n:ss[-n:ss]] **Description:** Resets module in specified slot.
G	#	RST BDL 1:ss:cc **Description:** Disconnects and reconnects the specified Integrated Trunk Module bundle to apply new bundle parameters.
G	#	RST CH n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]][/B] **Description:** Resets specified V-channel without affecting the channel connection, where: /B = optional modifier that causes V-channel (s) to be blocked until the RST CH command is re-issued to the specified channel (s)
G	#	RST DR n **Description:** Resets Driver Module in specified nest.
G	#	RST PS n **Description:** Resets online power supply for specified nest.
G	#	SET CKS **Description:** Calculates and stores database checksum on the online Network Module.
G	#	SET RLY **Description:** Activates relay test.
G	#	SET TON {EQ *or* LI} n:ss:cc [{/mmm *or* /P}] **Description:** Initiates a milliwatt reference equivalent test tone on specified DS-0 channel either toward the equipment or toward the LINK network, where: EQ = tone directed toward the DS-1 (or E-1) trunk, i.e., toward the external equipment LI = tone directed away from the DS-1 (or E-1) trunk toward an Interlink Module, I/O module, Voice Processor, or Channelized Services Processor, i.e., toward the LINK network

Table 7-1. Diagnostic Commands (Cont'd)

G	N	Command
	#	TRC BP Nxxxx {* *or* n:ss:c[-n:ss:c]... [,n:ss:c[-n:ss:c]] *or* n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]] *or* n:ss:cc:sr[-n:ss:cc:sr]... [,n:ss:cc:sr[-n:ss:cc:sr]]}[/F] ***NOTE**: This command can also be entered as* *TRC BP {* or n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]}/Nxxxx[/F]* To display bypass status for channels inbound or outbound on a specific intermachine link: TRC BP Nxxxx {n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]} {I *or* O} {ss *or* ss:cc}[/F] **Description:** Displays the bypass status for the specified channels, where Nxxxx specifies the originating or terminating node number, n:ss:c is an originating or terminating I/O channel, n:ss:cc is an originating or terminating DS-0 or X.50 DS-0 channel, n:ss:cc:sr is an originating or terminating X.50 subrate channel, and: I = inbound intermachine link O = outbound intermachine link ss = slot location of Interlink Module ss:cc = slot location and bundle of Integrated Trunk Module /F = optional modifier that causes list of nodes channel traverses to be displayed
	#	TRC CH {* *or* n:ss:cc[-n:ss:cc]... [,n:ss:cc[-n:ss:cc]]} or for X.50 subrate channels: TRC CH {* *or* n:ss:cc:sr[-n:ss:cc:sr]... [,n:ss:cc:sr[-n:ss:cc:sr]]} **Description:** Displays the status of the specified channel connection(s) at the originating or terminating node. Displays the V-channel (if connected), outbound link number, originator node, bypass node(s) (if any), and terminator. For CON DR channels, the path at each node is displayed. For disconnected channels, NOT CONNECTED is displayed.
G	#	TST DS0 {EQ *or* LI} {* *or* n:ss:cc[-n:ss:cc]...[,n:ss:cc[-n:ss:cc]]} **Description:** Causes milliwatt test tone to be transmitted on specified Voice Processor DS-0 channel(s) and detects whether tone is received back on the opposite side of the associated channel phasor(s). Result is PASS or FAIL.

Table 7-1. Diagnostic Commands (Cont'd)

G	N	Command
G	#	TST {L *or* R} {DAT *or* CNT} {C *or* P1 *or* P2}n:ss:c *or* {L *or* R} {DAT *or* CNT} {C *or* P1 *or* P2}n:ss:cc *or* {L *or* R} {DAT *or* CNT} {C *or* P1 *or* P2}n:ss:cc:sr **Description:** Conducts a complete or partial test of data, analog voice, or EIA control functions on the specified I/O module channel, where: L = local R = remote CNT = conducts a test of EIA control functions on channel n:ss:c DAT = conducts a test of data or analog voice on channel n:ss:c C = complete test P1 = partial test 1; constant data bit pattern, or EIA control functions in off condition P2 = partial test 2; constant data bit pattern that is different from the P1 bit pattern, or EIA control functions in on condition

G entry in "G" column indicates a nonglobal gateway command.
G entry in "G" column indicates a global gateway command.
entry in "N" column indicates that a command can be issued to a remote node by preceding the command with NOD xxxx.

c	=	I/O channel number (1 to 4)
cc	=	DS-0 channel number (1 to 31) or X.50 DS-0 channel number (1 to 16)
ccc	=	bypass channel number (1 to 511)
n	=	nest number: 1 = Control Mainframe; 2 = Expander A Mainframe (upper); 3 = Expander B Mainframe (lower)
n:ss:c	=	specifies single channel
n:ss:c,n:ss:c	=	specifies two or more channels
n:ss:c-n:ss:c	=	specifies range of channels in ascending order
sr	=	X.50 subrate channel number (1 to 20)
ss	=	slot number
xxxx	=	node number (1 to 2000)
/mm *or* /mmm	=	minutes remaining (1 - 15 for mm, 1 - 240 for mmm) before loopback, test tone, or busy out command is automatically cleared. If not specified, command will be cleared after 2 minutes.
/P	=	permanent; loopback, test tone, or busy out command will not be cleared automatically.
*	=	all elements in a range. Can also be used to specify all channels on a module, e.g., n:ss:*
…	=	used before [ ] symbol to indicate command can be entered with several parameter values. Dots are never entered as part of command.
{ }	=	required parameter. Choose one of the elements within braces. Braces are never entered as part of command.
[ ]	=	optional parameter. Brackets are never entered as part of command.

DIAGNOSTIC COMMANDS

Supervisory port diagnostic commands are described in the following paragraphs. Commands are in alphabetical order by command mnemonic. Related commands are discussed together.

Busy Out DS-0 (BSY) Command

The BSY command places specified DS-0 channel(s) in the busy state. The busy state is also called a remote equipment busy out (RE). When a DSP ST DS0 command is issued, the loop status of these channels will be displayed as RE type.

NOTE: *To place V-channel(s) on a Voice Server Module in the busy state, refer to the RST CH command in this chapter.*

Issuing the LP DS0 EQ command also places the remote end of specified DS-0 channel(s) in the busy state. The CLR LCL command clears specified channel(s) from the busy state.

Command:

[NOD xxxx] BSY **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}[{**/mmm *or* /P**}]**

where: /mmm = number of minutes (1-240) after which busy out is cleared automatically (default is 2 minutes)
/P = permanent; busy out will not be cleared automatically

Center Phasor (CEN PHS) Command

The CEN PHS command optimizes the phasor(s) of the specified Voice Processor DS-0 channel(s) to reduce timing errors.

Command:

[NOD xxxx] CEN PHS **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

Clear Bypass Channel Loop (CLR BP LP) Command

See "Loop Bypass Channel and Clear Bypass Channel Loop (LP BP, CLR BP LP) Commands" paragraph.

Clear Bypass Phasor (CLR BP PH) Command

The CLR BP PH command centers both channel phasors of specified bypass channel(s).

Command:

[NOD xxxx] CLR BP PH **{*** *or* ccc[-ccc]...**[**,ccc[-ccc]**]**
or 1:ss:ccc[-1:ss:ccc]...**[**,1:ss:ccc[-1:ss:ccc]**]}**

Clear I/O Module Channel Loop (CLR CH) Command

See "Loop I/O Module Channel and Clear Channel Loop (LP CH, CLR CH) Commands" paragraph.

Clear Intermachine Link Loop (CLR DL) Command

See "Loop Intermachine Link and Clear Intermachine Link Loop (LP DL, CLR DL) Commands" paragraph.

Clear DS-0 Channel Loop (CLR DS0) Command

See "Loop DS-0 Channel and Clear DS-0 Channel Loop (LP DS0, CLR DS0) Commands" paragraph.

Clear DS-1/E-1 Trunk Loop (CLR DS1) Command

See "Loop DS-1/E-1 Trunk and Clear Trunk Loop (LP DS1, CLR DS1) Commands" paragraph.

Clear Local DS-0 (CLR LCL) Command

The CLR LCL command clears channel(s) from the busy state (RE loopback state) at the local end of specified DS-0 channel(s) or bundled channels of specified master.

As long as any DS-0 channels that have been placed in loopback remain connected, the CLR DS0 command should be used to clear loopback at both ends of the DS-0 channel(s) in one operation. However, if the local Voice Processor, Integrated Trunk Module, or Channelized Services Processor is reset, the loopback will be cleared at the local end of the DS-0 channel(s), but the remote end will remain in a busy out state. In this situation, use CLR LCL at the remote node or NOD xxxx CLR LCL at the local node to clear the remote DS-0 busy out state.

Command:

[NOD xxxx] CLR LCL **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

Clear LFM (CLR LFM) Command

See "Loop LFM and Clear LFM (LP LFM, CLR LFM) Commands" paragraph.

Clear Test Generator (CLR MG) Command

See "Test Generator and Clear Test Generator (TST, CLR MG) Commands" paragraph.

Clear Phasor (CLR PH) Command

The CLR PH command is used to force the specified I/O module channel phasor(s) to center position.

Command:

[NOD xxxx] CLR PH **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**

Clear Alarm Relay (CLR RLY) Command

See "Set and Clear Alarm Relay (SET RLY, CLR RLY) Commands" paragraph.

Clear Tone Generator (CLR TON) Command

See "Set and Clear Tone Generator (SET TON, CLR TON) Commands" paragraph.

Loop Bypass Channel and Clear Bypass Channel Loop (LP BP, CLR BP LP) Commands

To perform a bidirectional loopback, Figure 7-1, on specified bypass channel(s), enter the LP BP command. The CLR BP LP command clears the loopback on specified bypass channel(s).

Commands:

[NOD xxxx] LP BP **{*** *or* ccc[-ccc]...**[**,ccc[-ccc]**]** *or* 1:ss:ccc[-1:ss:ccc]...**[**,1:ss:ccc[-1:ss:ccc]**]}**

[NOD xxxx] CLR BP LP **{*** *or* ccc[-ccc]...**[**,ccc[-ccc]**]** *or* 1:ss:ccc[-1:ss:ccc]...
[,1:ss:ccc[-1:ss:ccc]**]}**

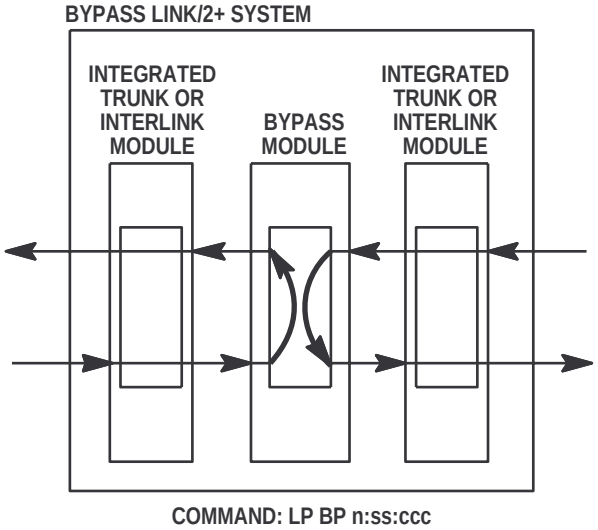


Figure 7-1. Bypass Channel Loopback

To test a bypass channel using the local test generator and test detector, enter:

- NOD xxxx DSP ST BP command to determine the bypass channel that connects to the local channel
- NOD xxxx LP BP command to loop the bypass channel
- LP CH command to loop the local channel toward the bypass node
- TST R command to initiate a complete or partial test message that is looped first by the local channel and passed across an intermachine link to the bypass channel. The bypass channel loops the test message back across an intermachine link to the local test detector.

Loop I/O Module Channel and Clear Channel Loop (LP CH, CLR CH) Commands

The LP CH command places specified I/O module channel(s) in loopback. The CLR CH command clears specified channel(s) from loopback or any associated V-channel loopback(s) that may exist, restoring channel(s) to normal operation.

Commands:

[NOD xxxx] LP *loopback* CH **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**
[{/I *or* /O**}][***speed***][**/P**]**

[NOD xxxx] CLR CH **{*** *or* n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**

where *loopback* is one of the following:

LB	=	bidirectional bus loopback
RB	=	bidirectional bus loopback
LP	=	parallel bidirectional loopback of Quad Synchronous Processor or Isochronous Communication Module channels only
LS	=	serial bidirectional loopback of Quad Synchronous Processor or Isochronous Communication Module channels only
LD	=	local modem local digital loopback for data channels; bidirectional channel controller loopback for Quad Voice Module and Enhanced Voice Module channels only
LA	=	local modem local analog loopback for data channels; codec loopback for Quad Voice Module and Enhanced Voice Module channels only
RA	=	remote modem remote analog loopback
RD	=	remote modem remote digital loopback
VS	=	used with Quad Voice Module channels serviced by a Voice Server Module. Places associated V-channel in bidirectional loopback

NOTE: */P is a* ***required*** *modifier that is used with VS loopback only.*

Optional modifiers /I and /O are used with asymmetrical channels only:

/I	=	runs loopback using input speed. Default loopback speed is /I.
/O	=	runs loopback using output speed

Speed is an optional modifier used with Isochronous Communication Module and Dual Isochronous Module channels only to alter the nominal test speeds of isochronous communication loopback testing:

/F = force output frequency faster than nominal communication speed
/S = force output frequency slower than nominal communication speed
/R = force output frequency equal to nominal communication speed

If speed modifier is not entered, default is a normal loopback with phasor timing.

NOTES: *No warning is given if VS loopback is specified and channel is not being processed by a Voice Server Module.*

LP RB CH command is not used with Quad Synchronous Processors. Use LP LS CH and LP LP CH commands for Quad Synchronous Processor bidirectional loopbacks.

If a Quad Synchronous Module channel is disconnected while still in loopback, the channel status will be shown as in loopback (not as disconnected) when a DSP ST CH command is issued. To avoid this, clear the loopback before disconnecting the channel.

PRECAUTION: ***When more than one channel on a Quad Asynchronous Module is set to a speed of 19.2 kbps and one of the 19.2 kbps channels is placed in remote loopback (NOD xxxx LP loopback CH), if one or more other 19.2 kbps channels is connected, the channel in loopback will lose synchronization.***

This problem does not occur when an external loopback plug is used at the remote node.

To test local I/O module channels with the local test generator and test detector, use the LP CH command with the TST L command.

To test remote I/O module channels that connect to local I/O module channels using the local test generator and test detector with the TST R command:

- Loop the remote channel toward the local channel using the NOD xxxx LP CH command.
- Loop the local I/O channel toward the remote channel using the LP CH command.
- Use the TST R command to initiate a complete or partial test message that is looped first by the local channel and passed across an intermachine link to the remote channel. The remote channel loops the test message back across an intermachine link to the local node where the message is received by the test detector.

NOTE: *Local and remote channel loopback tests, when used on data channels, require that the tail circuit modems accept test signals (CCITT circuits 140 and 141).*

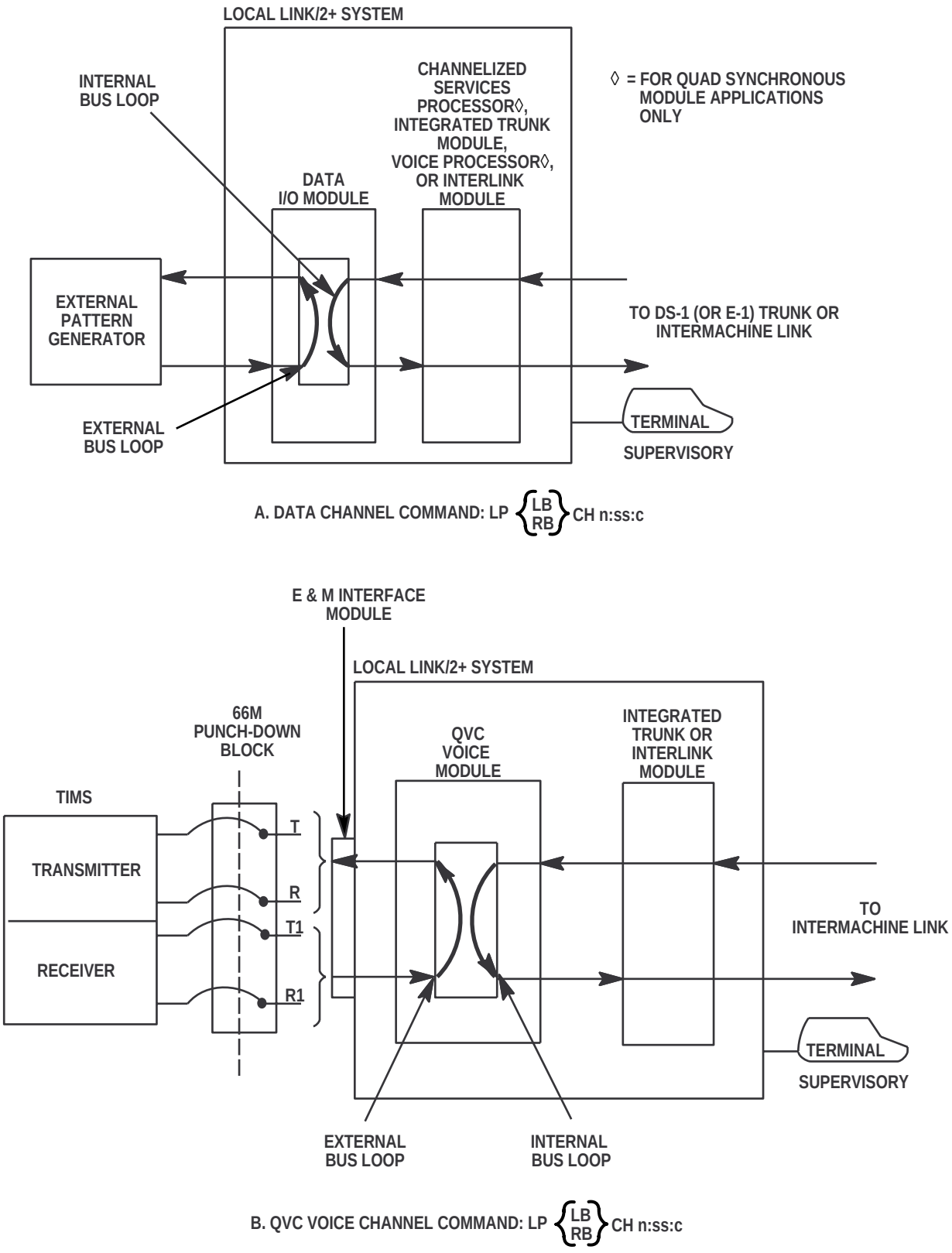


Figure 7-2. Bidirectional Bus Channel Loopbacks

Bidirectional Bus Loopbacks

The LP LB CH and LP RB CH commands loop the circuit bidirectionally at the local I/O module channel interface, Figure 7-2A. The internal bus loop can be tested using the internal test generator and test detector. The external bus loop can be tested using an external pattern generator or a terminal.

For QVC Voice Module channels only, the external bus loop which passes through the E & M Interface Module can be tested using a transmission impairment measurement set (TIMS), Figure 7-2B.

Bidirectional Loopbacks

The LP LS CH and LP LP CH commands place the specified Quad Synchronous Processor channels in loopback, Figures 7-3 and 7-4. The LP LS CH command can also be used with Isochronous Communication Module channels.

Quad Synchronous Processor channels can be synchronous I/O channels, Switched 56K Service channels, or broadcast/polled channels.

Isochronous Communication Module channels can be plesiochronous data at rates of up to 1.544 Mbps or isochronous data at rates of up to 512 kbps.

NOTES: *An LS loopback for a DTE1 channel will result in a loop timed interface. An LP loopback for a DTE1 channel will result in the transmit clock being driven from the system timing source. An LS loopback for a DTE2 channel is not supported unless both the receive and transmit clocks are phase aligned, but the LP loopback will always work regardless of clocking configuration.*

When a Quad Synchronous Processor channel is in LP loopback, the DSP FN command will show ***remote input*** *functions in the "O=" part of the display. See the Display Commands chapter for a description of the DSP FN command.*

When a Quad Synchronous Processor DTE2 port is programmed for a bus/serial bidirectional loopback, the local user (external DTE2) input clock clocks data both into and out of the ports. Additionally, remote data to and from the intermachine link is clocked from the output phasor into the input phasor using the local user DTE2 output clock.

When a Quad Synchronous Processor DTE2 port is programmed for a parallel bidirectional loopback, the following operation is supported:

- *The local user (external DTE2) input clock is used to clock local data into the local port and the local user (external DTE2) output clock is used to clock local data from the local port.*

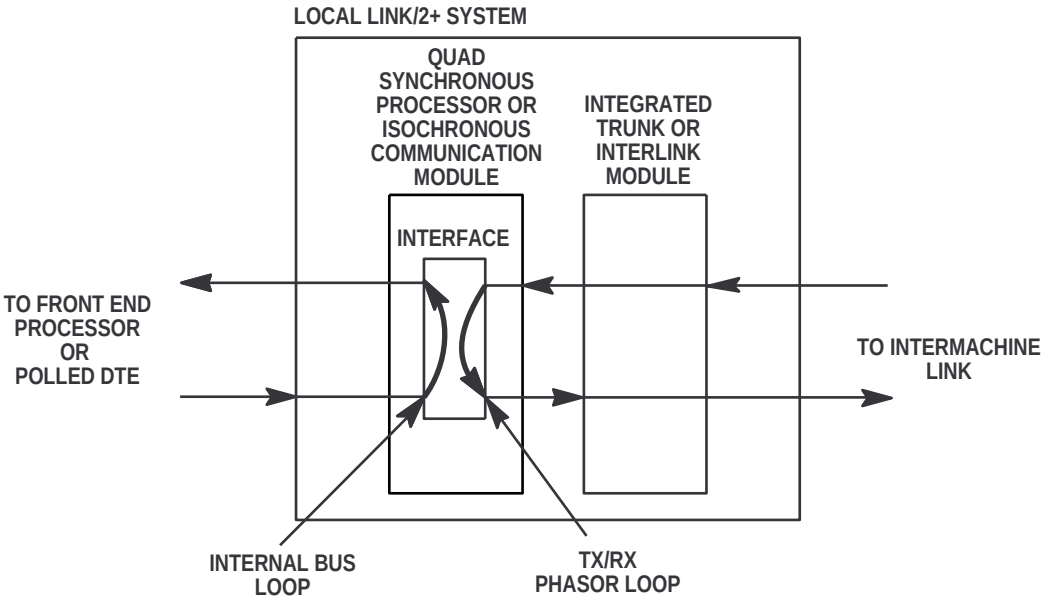

LOCAL LINK/2+ SYSTEM
QUAD SYNCHRONOUS PROCESSOR OR ISOCHRONOUS COMMUNICATION MODULE
INTEGRATED TRUNK OR INTERLINK MODULE
INTERFACE
TO FRONT END PROCESSOR OR POLLED DTE
TO INTERMACHINE LINK
INTERNAL BUS LOOP
TX/RX PHASOR LOOP
COMMAND: LP LS CH n:ss:c

Figure 7-3. Serial Bidirectional Loopback

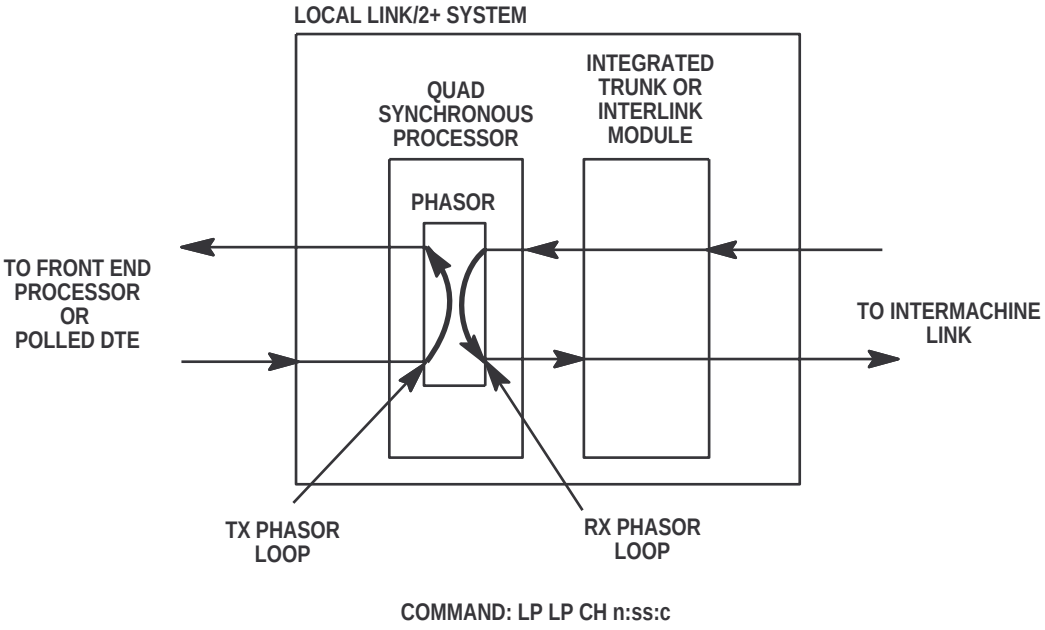


Figure 7-4. Parallel Bidirectional Loopback

- *No clock but rather the intermachine link's scan cycle is used to clock data both from the local intermachine link to the local port and from the local port to the local intermachine link, over the local bus interface.*

When an Isochronous Communication Module DTE2 port is programmed for a bus/serial bidirectional loopback, the local user (external DTE2) input clock clocks data both into and out of the ports. Additionally, remote data to and from the Isochronous Communication Module is clocked from the output phasor into the input buffer using the output phasor's derived clock.

When an Isochronous Communication Module DTE2 port is programmed for a parallel bidirectional loopback, the following operation is supported:

- *The local user (external DTE2) input clock is used to clock local data into the local port, and the local user (external DTE2) output clock is used to clock local data from the local port.*
- *No clock but rather the intermachine link scan cycle is used to clock data both from the local intermachine link to the local port and from the local port to the local intermachine link, over the local bus interface.*

Local Digital Channel Loopback

For data channels, the LP LD CH command directs an external modem to loop the circuit at the digital interface of the local modem, Figure 7-5A. If the external modem does not accept the test control signals, use a loopback plug, Figure 7-6. For Quad Voice Module or Enhanced Voice Module channels only, the LP LD CH command loops the circuit bidirectionally at the channel controller, Figure 7-5B. The external channel controller loop can be tested using an external TIMS. The internal loop can be tested using the internal test generator and detector or a remote TIMS. The Enhanced Voice Module is equipped with front panel test jacks which may be used to connect the TIMS and conduct loopback testing.

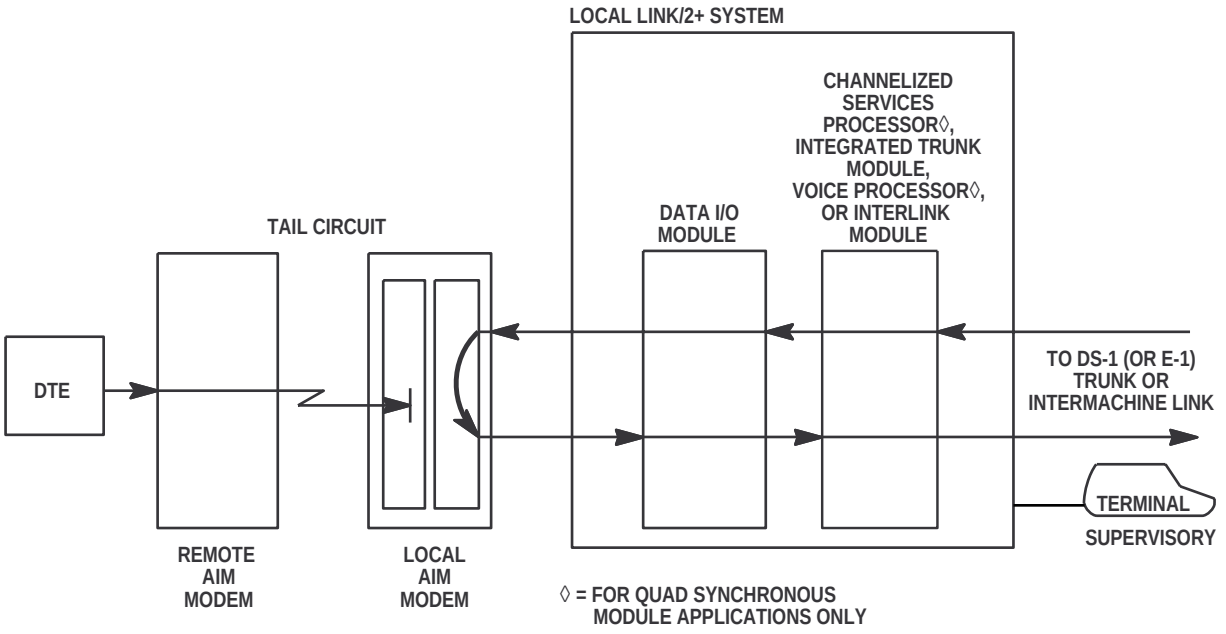
Local Analog Channel Loopback

For data channels, the LP LA CH command directs an external modem to loop the circuit at the analog interface of the local modem, Figure 7-7A (CCITT circuit 141 output on pin 16 of I/O channel connector).

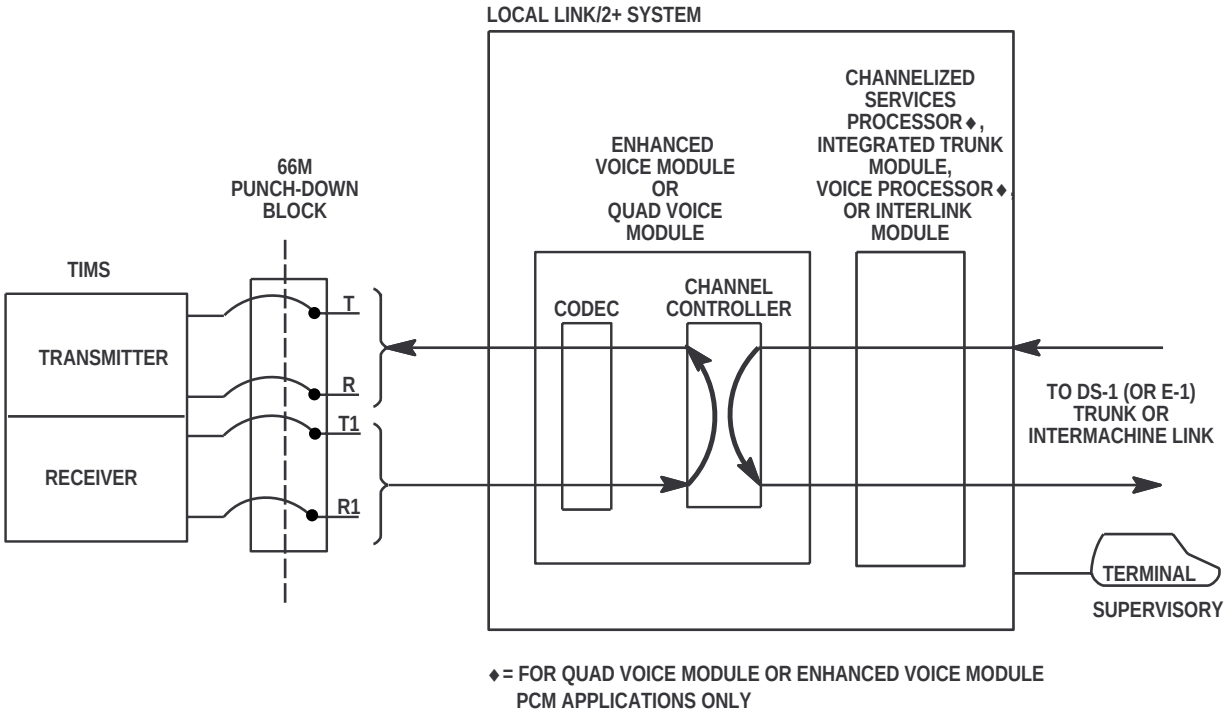
For Quad Voice Module or Enhanced Voice Module channels, the LP LA CH command loops the circuit at the analog interface of the codec, Figure 7-7B. The codec loop can be tested using an external TIMS at the opposite end of the channel connection.

For QSP.2 Quad Synchronous Processor data channels connected to a Link Framing Module, the LP LA CH command causes the Link Framing Module to enter a remote digital loop via the QSP-LFM cable.

NOTE: *For the Isochronous Communication Module, whenever a local analog (LA) or local digital (LD) loopback is selected, the Isochronous Communication Module will always execute a local analog loopback.*


LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR◊, INTEGRATED TRUNK MODULE, VOICE PROCESSOR◊, OR INTERLINK MODULE
DATA I/O MODULE
TAIL CIRCUIT
DTE
TO DS-1 (OR E-1) TRUNK OR INTERMACHINE LINK
TERMINAL
SUPERVISORY
REMOTE AIM MODEM
LOCAL AIM MODEM
◊ = FOR QUAD SYNCHRONOUS MODULE APPLICATIONS ONLY

A. DATA CHANNEL COMMAND: LP LD CH n:ss:c



B. VOICE CHANNEL COMMAND: LP LD CH n:ss:c

Figure 7-5. Local Digital Channel Loopback

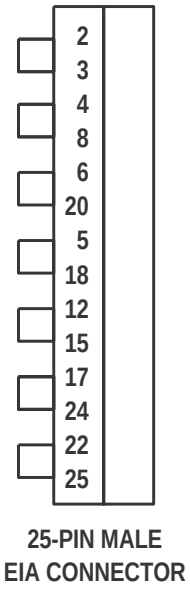
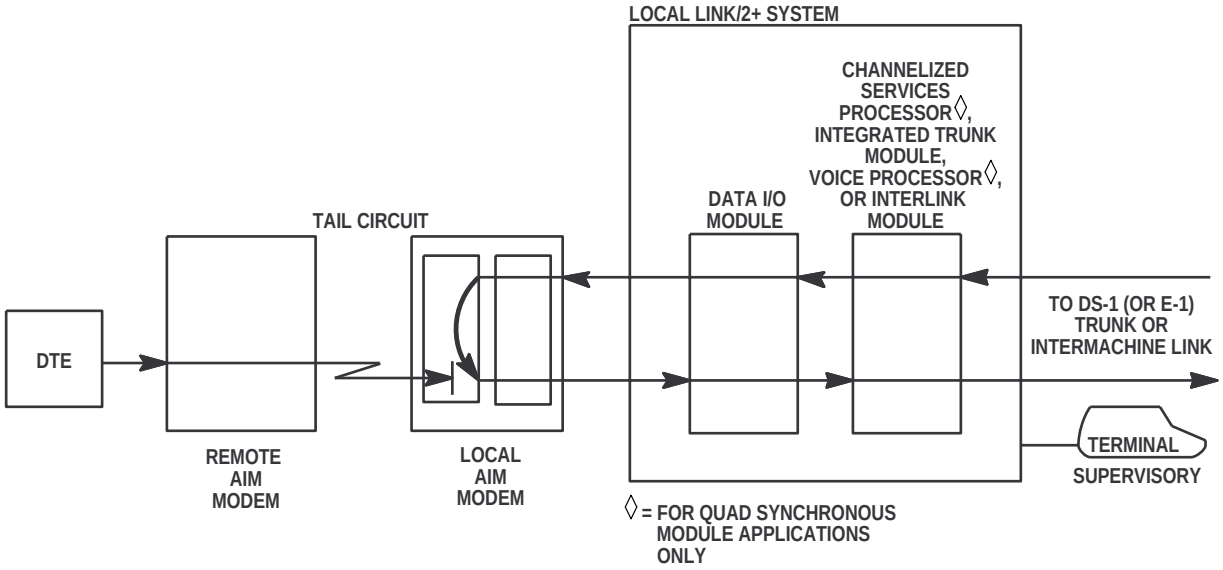
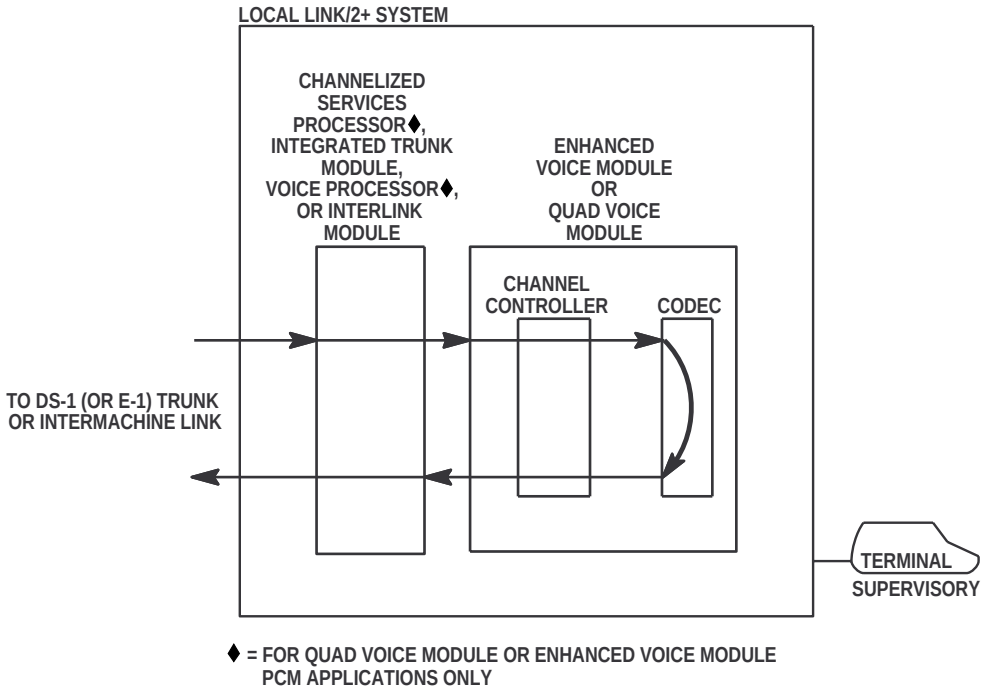


Figure 7-6. I/O Module Channel Loopback Plug for DTE1 or DCE (Unbalanced Interface)


LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR◊, INTEGRATED TRUNK MODULE, VOICE PROCESSOR◊, OR INTERLINK MODULE
DATA I/O MODULE
TAIL CIRCUIT
DTE
TO DS-1 (OR E-1) TRUNK OR INTERMACHINE LINK
TERMINAL SUPERVISORY
REMOTE AIM MODEM
LOCAL AIM MODEM
◊ = FOR QUAD SYNCHRONOUS MODULE APPLICATIONS ONLY

A. DATA CHANNEL COMMAND: LP LA CH n:ss:c (CCITT Circuit 141)


LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR♦, INTEGRATED TRUNK MODULE, VOICE PROCESSOR♦, OR INTERLINK MODULE
ENHANCED VOICE MODULE OR QUAD VOICE MODULE
CHANNEL CONTROLLER
CODEC
TO DS-1 (OR E-1) TRUNK OR INTERMACHINE LINK
TERMINAL SUPERVISORY
♦ = FOR QUAD VOICE MODULE OR ENHANCED VOICE MODULE PCM APPLICATIONS ONLY

NOTE: ON QVM.6 VOICE MODULE, LOOPBACK IS BIDIRECTIONAL.

B. VOICE CHANNEL COMMAND: LP LA CH n:ss:c

Figure 7-7. Local Analog Channel Loopback

Remote Analog Channel Loopback

The LP RA CH command directs an external modem to loop the data channel circuits only at the analog interface of the remote modem, Figure 7-8. For QSP.2 Quad Synchronous Processor data channels connected to an LFM.1 Link Framing Module, the LP RA CH command causes the LFM.1 Link Framing Module to enter a local analog loop via the QSP-LFM cable.

NOTE: *For the Isochronous Communication Module, whenever a remote analog (RA) or remote digital (RD) loopback is selected, the Isochronous Communication Module will always execute a remote digital loopback.*

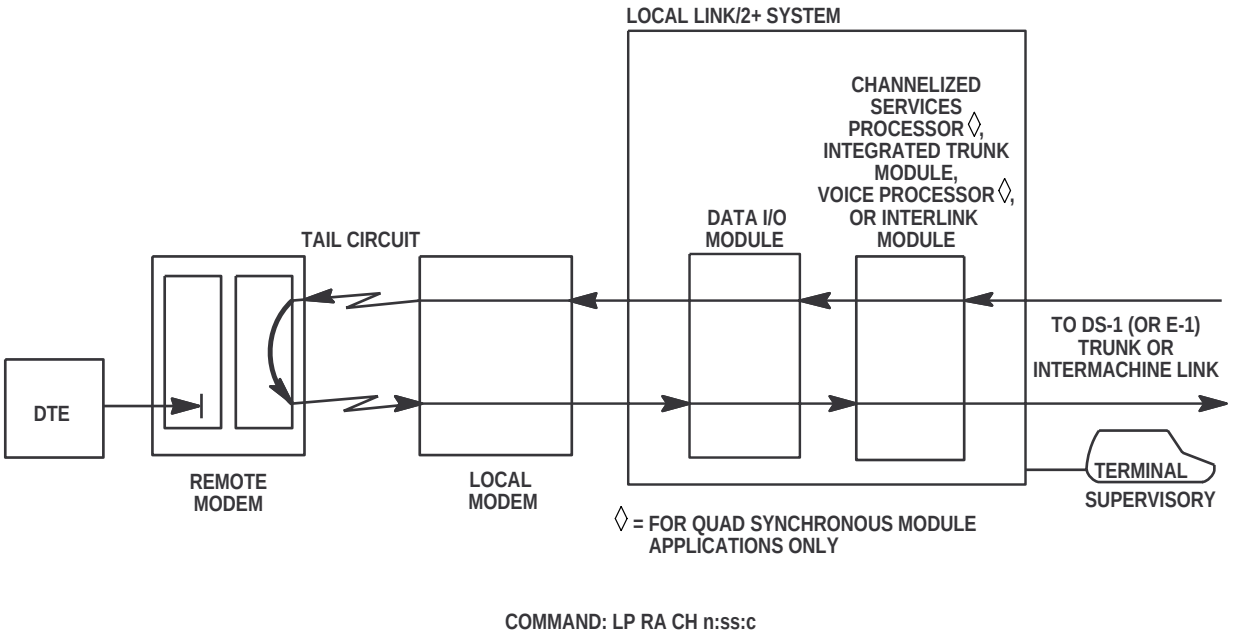

LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR ◊, INTEGRATED TRUNK MODULE, VOICE PROCESSOR ◊, OR INTERLINK MODULE
DATA I/O MODULE
TAIL CIRCUIT
TO DS-1 (OR E-1) TRUNK OR INTERMACHINE LINK
DTE
TERMINAL SUPERVISORY
REMOTE MODEM
LOCAL MODEM
◊ = FOR QUAD SYNCHRONOUS MODULE APPLICATIONS ONLY
COMMAND: LP RA CH n:ss:c

Figure 7-8. Remote Analog Channel Loopback

Remote Digital Channel Loopback

The LP RD CH command directs an external modem to loop the data channel circuits only at the digital interface of the remote modem, Figure 7-9 (CCITT circuit 140 output on pin 5 of I/O channel connector).

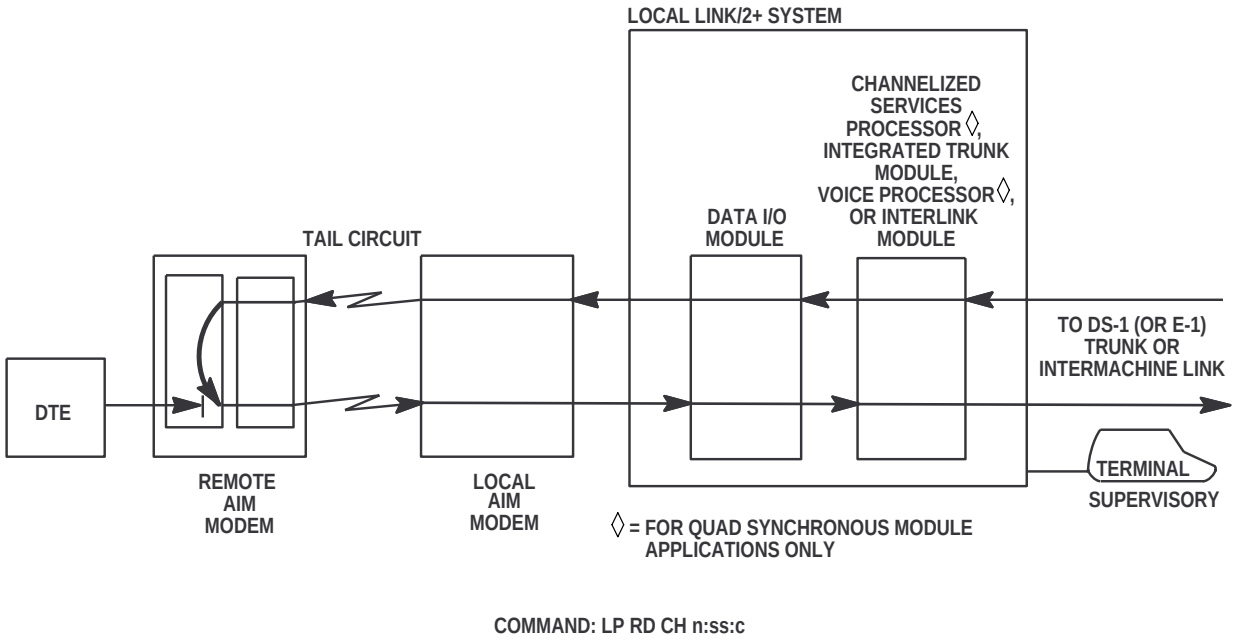

LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR ◊, INTEGRATED TRUNK MODULE, VOICE PROCESSOR ◊, OR INTERLINK MODULE
DATA I/O MODULE
TAIL CIRCUIT
TO DS-1 (OR E-1) TRUNK OR INTERMACHINE LINK
DTE
TERMINAL SUPERVISORY
REMOTE AIM MODEM
LOCAL AIM MODEM
◊ = FOR QUAD SYNCHRONOUS MODULE APPLICATIONS ONLY
COMMAND: LP RD CH n:ss:c

Figure 7-9. Remote Digital Channel Loopback (CCITT Circuit 140)

Bidirectional V-Channel Loopback

The LP VS CH command is issued to a Quad Voice Module channel serviced by a Voice Server Module. This command places the associated V-channel on the Voice Server Module in bidirectional loopback. The V-channel PCM phasor data is looped back towards the Quad Voice Module and the V-channel processed phasor data is looped back towards the Interlink Module or Integrated Trunk Module, Figure 7-10.

To test the PCM phasor side (towards the Quad Voice Module in Figure 7-10) of the local Voice Server Module V-channel, use an external TIMS connected to the associated local Quad Voice Module port.

To test the processed phasor side (towards the Integrated Trunk or Interlink Module in Figure 7-10) of the local Voice Server Module V-channel, use an external TIMS connected to the associated remote Quad Voice Module port at the other end of the channel connection. The test signal is sent from the remote node over the intermachine link to the local Voice Server Module and then looped back across the intermachine link to the remote TIMS.

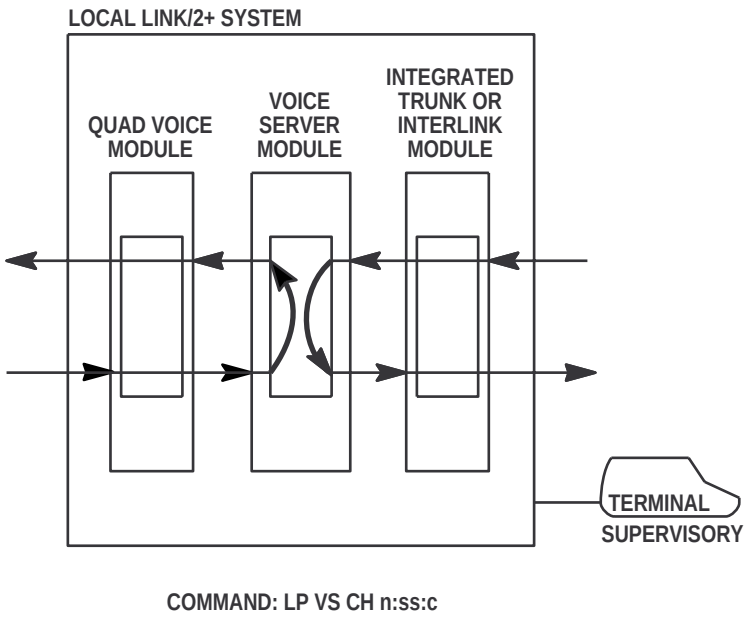


Figure 7-10. Bidirectional V-Channel Loopback

Loop Intermachine Link and Clear Intermachine Link Loop (LP DL, CLR DL) Commands

The LP DL command places intermachine link(s) associated with Interlink Module(s) specified by slot ss in loopback. An optional loopback time of between 1 and 15 minutes is permitted with the default time being 2 minutes. Optional permanent loopbacks are allowed locally.

The CLR DL command clears specified intermachine link(s) from loopback, restoring intermachine link(s) to normal operation.

Commands:

[NOD xxxx] LP *loopback* DL **{*** *or* ss[-ss]...**[**,ss[-ss]**]}[{**/R *or* /T**}][{**/mm *or* /P**}]**

where *loopback* is one of the following:

LB = local Interlink Module bus loopback
LD = local line driver local digital loopback
LA = local line driver local analog loopback
RA = remote line driver remote analog loopback
RD = remote line driver remote digital loopback
RB = remote Interlink Module bus loopback

NOTE: *RA, RD, and RB cannot be performed on asymmetrical/simplex links.*

and where: ss = Interlink Module slot number
/mm = number of minutes (1-15) after which loopback is cleared automatically (default is 2 minutes)
/P = permanent; loopback will not be cleared automatically. Cannot be used for loopbacks issued to a remote node.

Optional modifiers /R and /T are used with asymmetrical links only:

/R = runs loopback using received speed. Default loopback speed is /R.
/T = runs loopback using transmit speed

[NOD xxxx] CLR DL **{**** or* ss[-ss]...**[**,ss[-ss]**]}**

where: ss = Interlink Module slot number

Executing the LP DL command results in an immediate display of the loopback status. An example of placing the Interlink Module in slot 7 into local bus loopback for 9 minutes is:

Command: LP LB DL 7/09

Response: LINK 1:07
LOOP= LB TIME: 09

If the Interlink Module fails to go into loopback, one of the following error messages will be displayed:

- TIMED OUT BEFORE LOOPBACK
- MUST NOT LOOPBACK SYSTEM CLOCK
- MUST NOT INITIATE RB LOOPBACK IF TXCLOCK=RCV

Intermachine Link Loopback Tests

To perform an intermachine link loopback test, a channel must be connected across the intermachine link in loopback using the CON DR programming command.

- The intermachine link in loopback must be in the routing table at the destination node of the specified channel.
- The path number specified in the CON DR command must establish a route for the specified channel via the intermachine link in loopback in the command.

To test the intermachine link loopbacks with the internal test generator, use the TST R command with a local I/O module channel loopback. The TST R command initiates a test message that is looped by an I/O module channel to the Interlink Module. The intermachine link loopback will loop the test message back to the local test detector.

To test the intermachine link loopback with external test equipment, connect an external pattern generator to the channel that is connected across the intermachine link in loopback. The test signal will enter the LINK/2+ System through the channel and will be looped back to the test equipment by the intermachine link loopback.

NOTE: *Any intermachine link that is providing timing to a node cannot be looped toward that node. Intermachine link loopback commands will be rejected by the LINK/2+ System and result in the error message: MUST NOT LOOPBACK SYSTEM CLOCK. An exception is an intermachine link defined on the clock fallback list as a DRI clock source. The intermachine link would still qualify as an acceptable nodal timing source if either a remote bus or an external loopback is performed.*

Local Bus Intermachine Link Loopbacks

The LP LB DL command loops the circuit at the Interlink Module bus, Figure 7-11.

Local Digital Intermachine Link Loopback

The LP LD DL command loops the circuit at the bipolar encoder/decoder of the local line driver (for example, Digital Termination Module or Link Framing Module), Figure 7-12, or directs an external modem to loop the local digital interface, Figure 7-13A. If the modem does not accept loopback commands, use a loopback plug on the Interlink Module, Figure 7-15A.

Local Analog Intermachine Link Loopback

The LP LA DL command loops the circuit at the bipolar encoder/decoder of the local line driver, Figure 7-12, directs an external modem to loopback at the local analog interface, Figure 7-13B, or loops the circuit at the buffer of the local LFM.14 Link Framing Module, Figure 7-14. Loopback plugs can be used on Digital Termination Modules and Link Framing Modules, Figure 7-15B.

NOTE: *On Digital Termination Modules and Link Framing Modules, the LP LD DL and LP LA DL commands loop the intermachine link at the same location.*

PRECAUTION: ***The LP LA DL command must not be used on an intermachine link with an LFM.3 Link Framing Module that uses receive (RCV) timing if the Network Module is not type C or D. With any other Network Module, the required clocking cannot be supplied for this loop command under these conditions.***

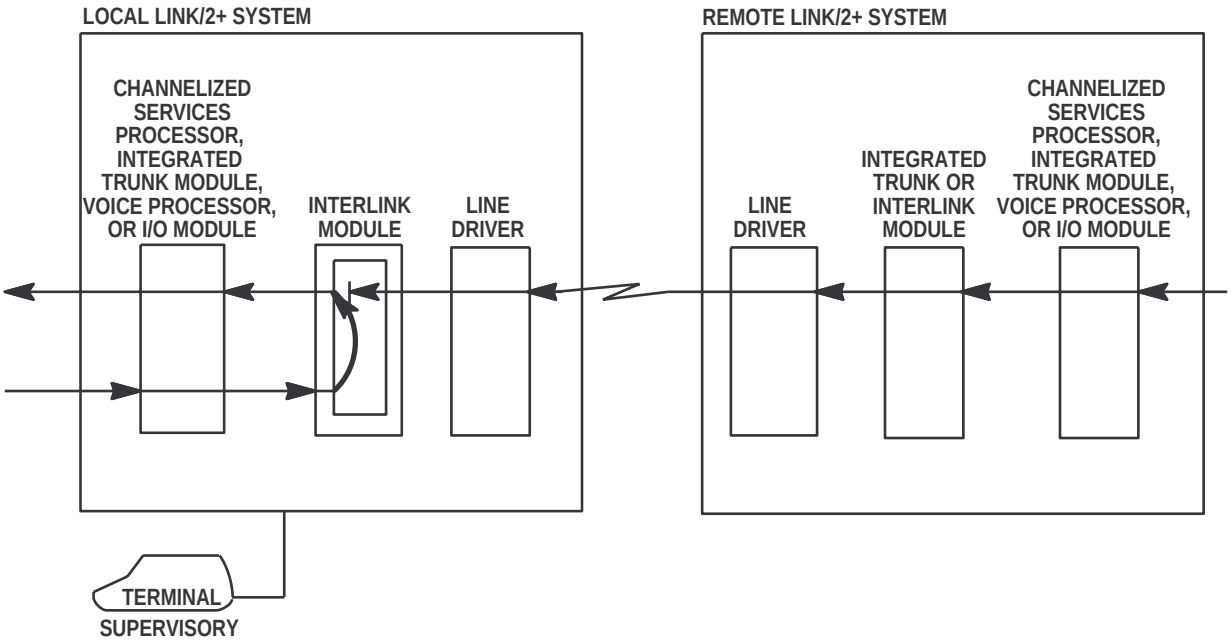

LOCAL LINK/2+ SYSTEM
REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTERLINK MODULE
LINE DRIVER
LINE DRIVER
INTEGRATED TRUNK OR INTERLINK MODULE
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
TERMINAL SUPERVISORY
COMMAND: LP LB DL ss

Figure 7-11. Local Bus Intermachine Link Loopback

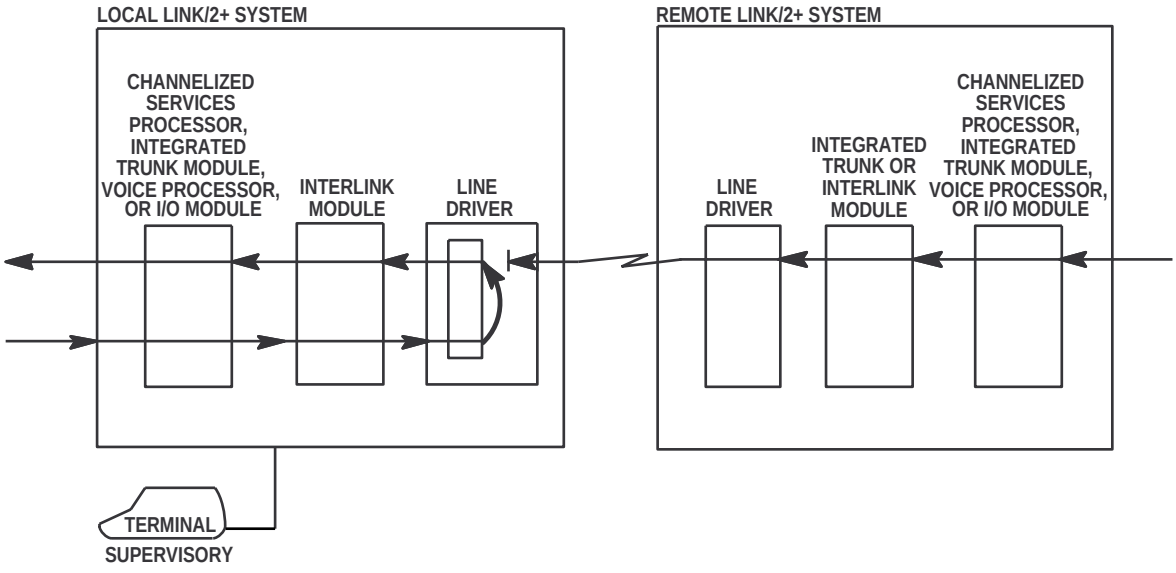

LOCAL LINK/2+ SYSTEM
REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTERLINK MODULE
LINE DRIVER
LINE DRIVER
INTEGRATED TRUNK OR INTERLINK MODULE
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
TERMINAL SUPERVISORY
COMMAND: LP LD DL ss or LP LA DL ss
A. LINE DRIVER IN ONE-TO-ONE MODE WITHOUT BIM.2 OR BIM.3 BIPOLAR INTERFACE MODULE

Figure 7-12. Local Digital and Local Analog Intermachine Link Loopbacks for Line Drivers (Sheet 1 of 5)

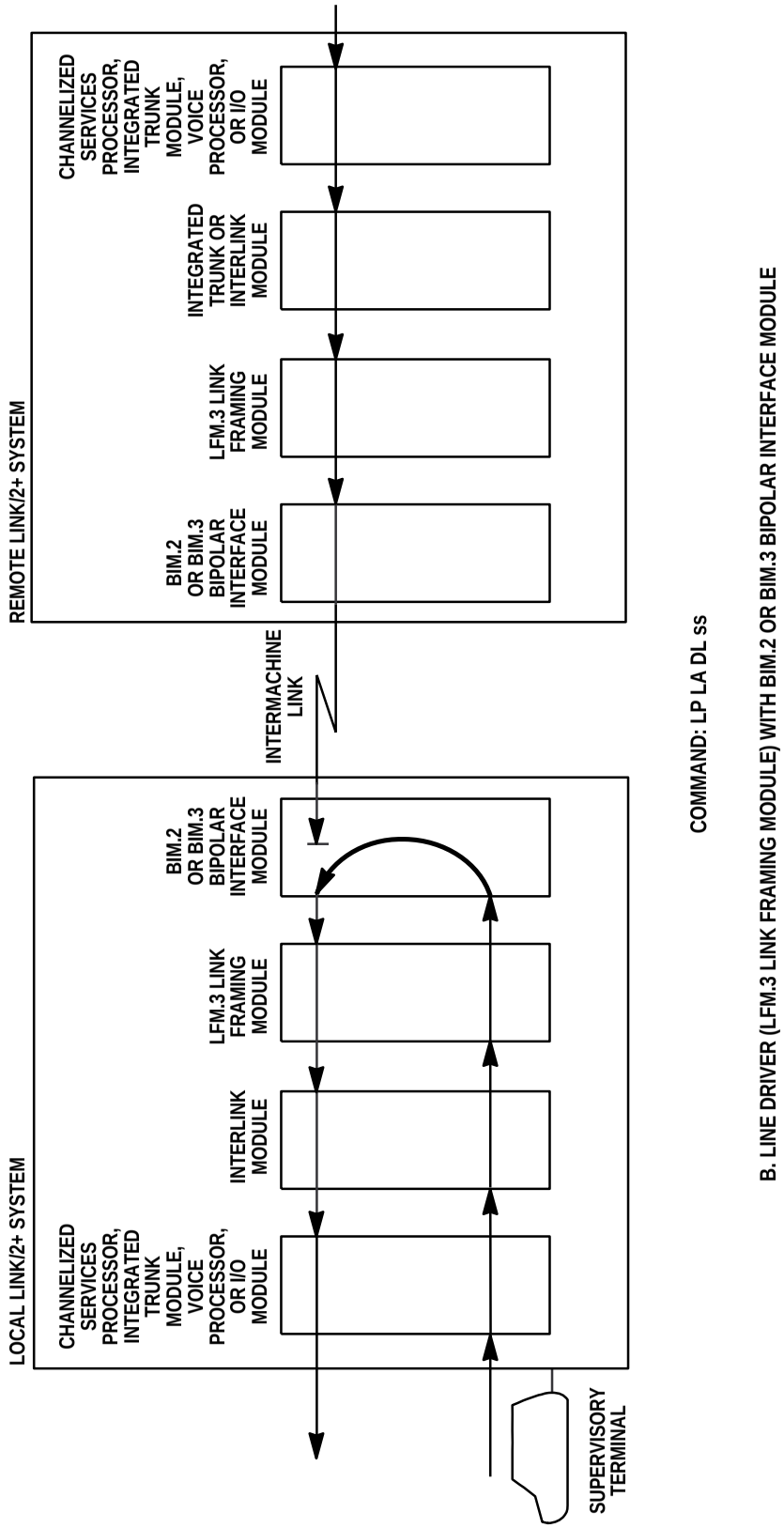

REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTEGRATED TRUNK OR INTERLINK MODULE
LFM.3 LINK FRAMING MODULE
BIM.2 OR BIM.3 BIPOLAR INTERFACE MODULE
INTERMACHINE LINK
LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTERLINK MODULE
LFM.3 LINK FRAMING MODULE
BIM.2 OR BIM.3 BIPOLAR INTERFACE MODULE
SUPERVISORY TERMINAL
COMMAND: LP LA DL ss
B. LINE DRIVER (LFM.3 LINK FRAMING MODULE) WITH BIM.2 OR BIM.3 BIPOLAR INTERFACE MODULE

Figure 7-12. Local Digital and Local Analog Intermachine Link Loopbacks for Line Drivers (Sheet 2)

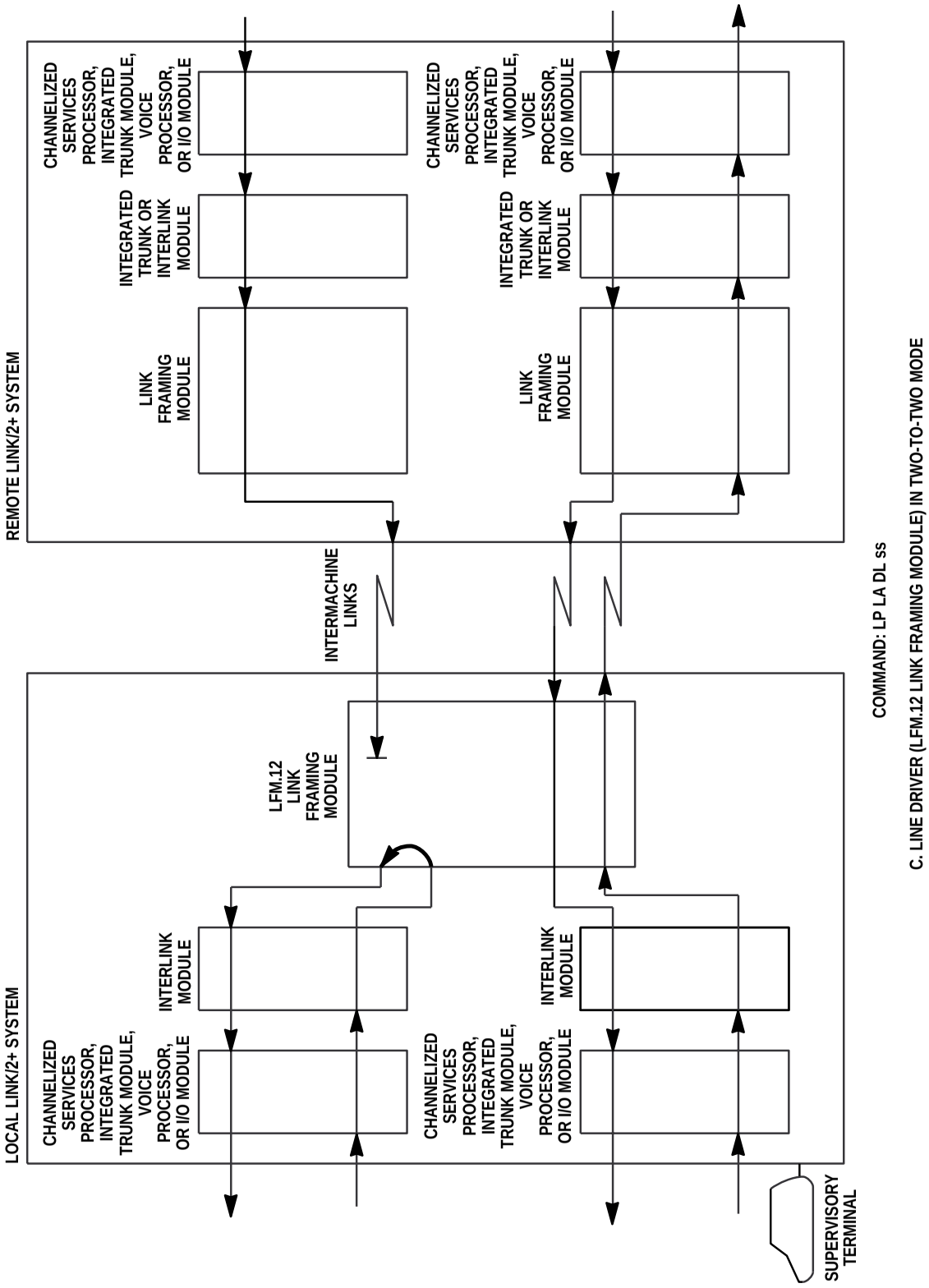

REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTEGRATED TRUNK OR INTERLINK MODULE
LINK FRAMING MODULE
INTERMACHINE LINKS
LOCAL LINK/2+ SYSTEM
LFM.12 LINK FRAMING MODULE
INTERLINK MODULE
SUPERVISORY TERMINAL
COMMAND: LP LA DL ss
C. LINE DRIVER (LFM.12 LINK FRAMING MODULE) IN TWO-TO-TWO MODE

Figure 7-12. Local Digital and Local Analog Intermachine Link Loopbacks for Line Drivers (Sheet 3)

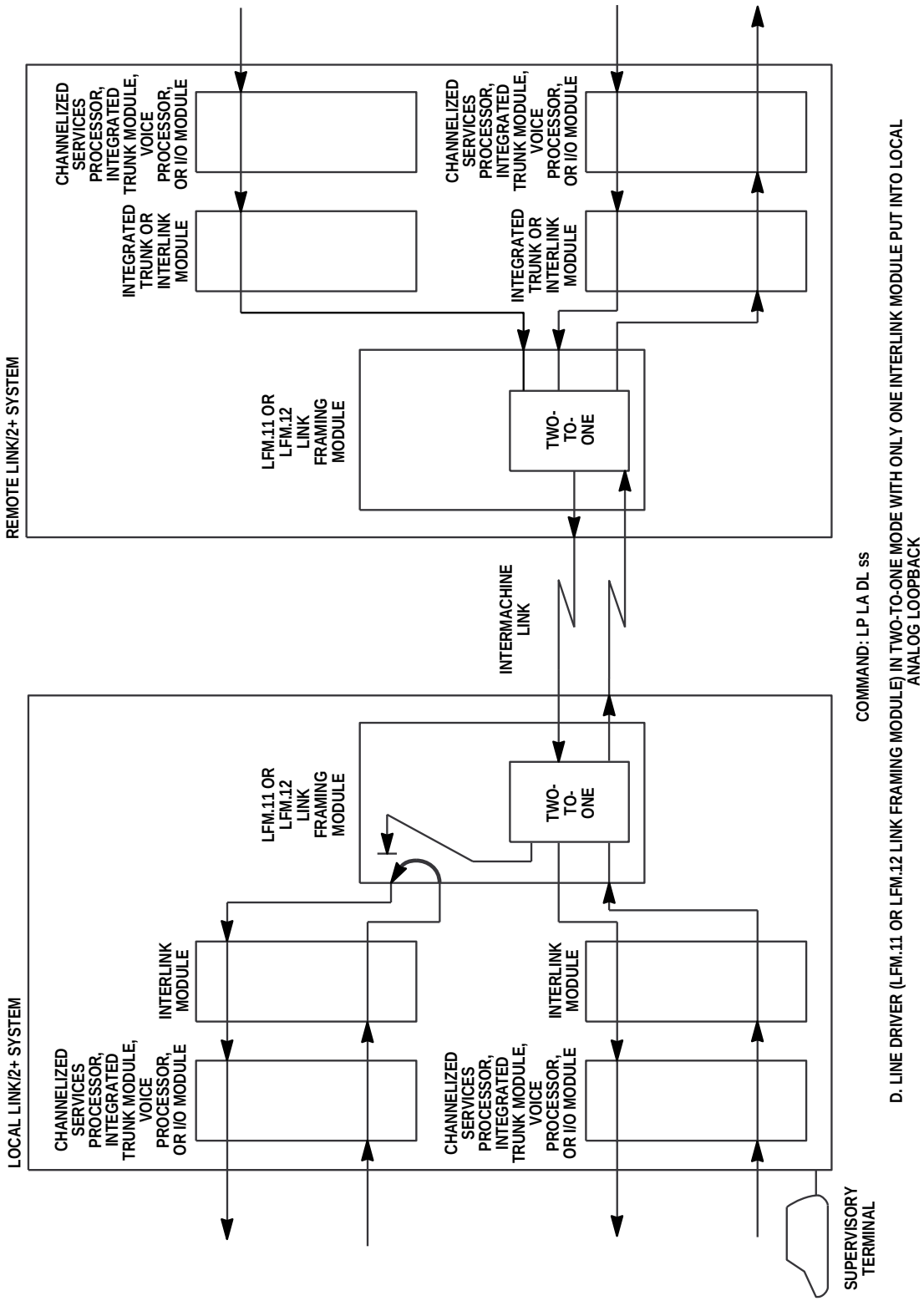

REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTEGRATED TRUNK OR INTERLINK MODULE
LFM.11 OR LFM.12 LINK FRAMING MODULE
TWO-TO-ONE
INTERMACHINE LINK
LOCAL LINK/2+ SYSTEM
INTERLINK MODULE
COMMAND: LP LA DL ss
D. LINE DRIVER (LFM.11 OR LFM.12 LINK FRAMING MODULE) IN TWO-TO-ONE MODE WITH ONLY ONE INTERLINK MODULE PUT INTO LOCAL ANALOG LOOPBACK
SUPERVISORY TERMINAL

Figure 7-12. Local Digital and Local Analog Intermachine Link Loopbacks for Line Drivers (Sheet 4)

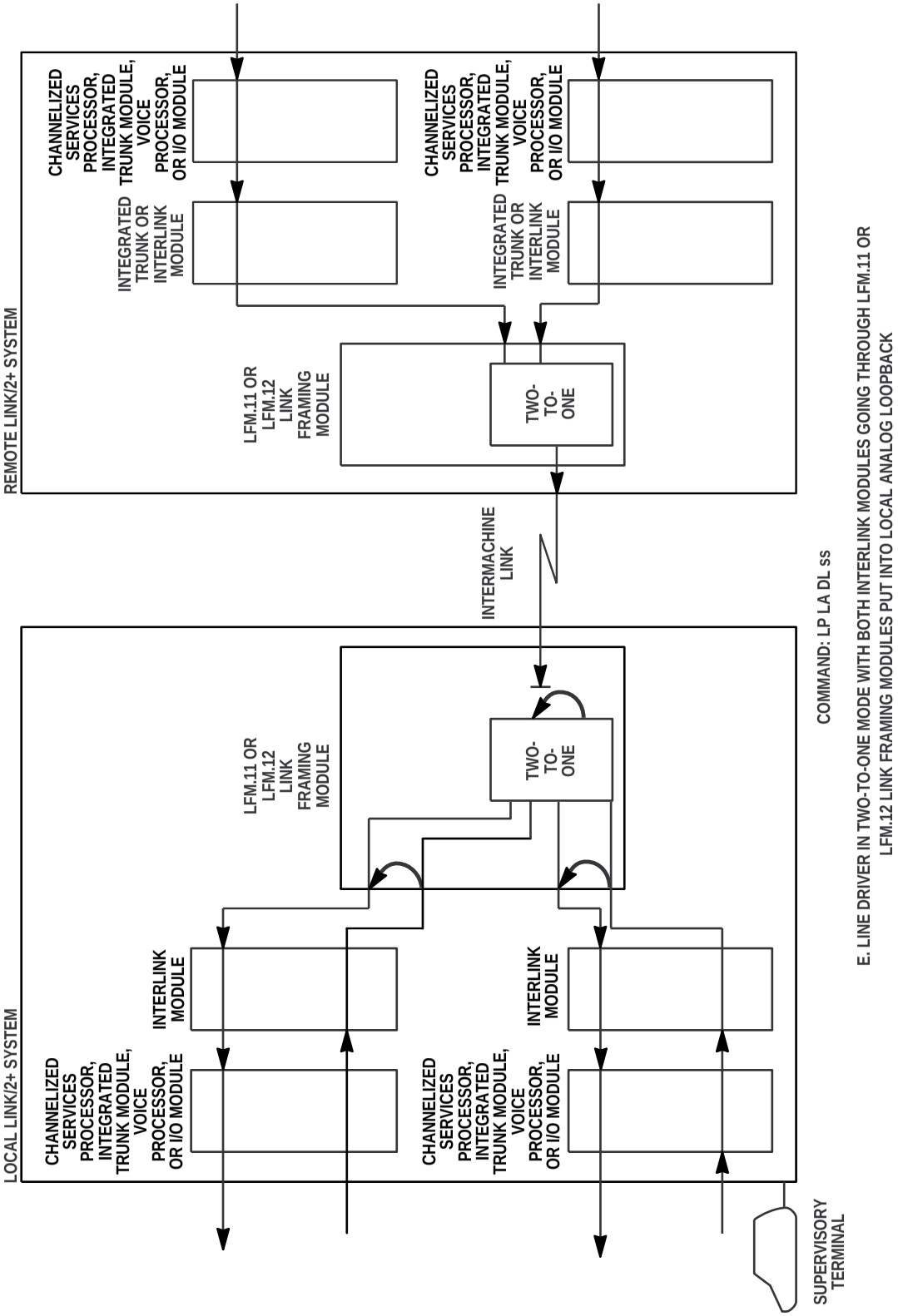
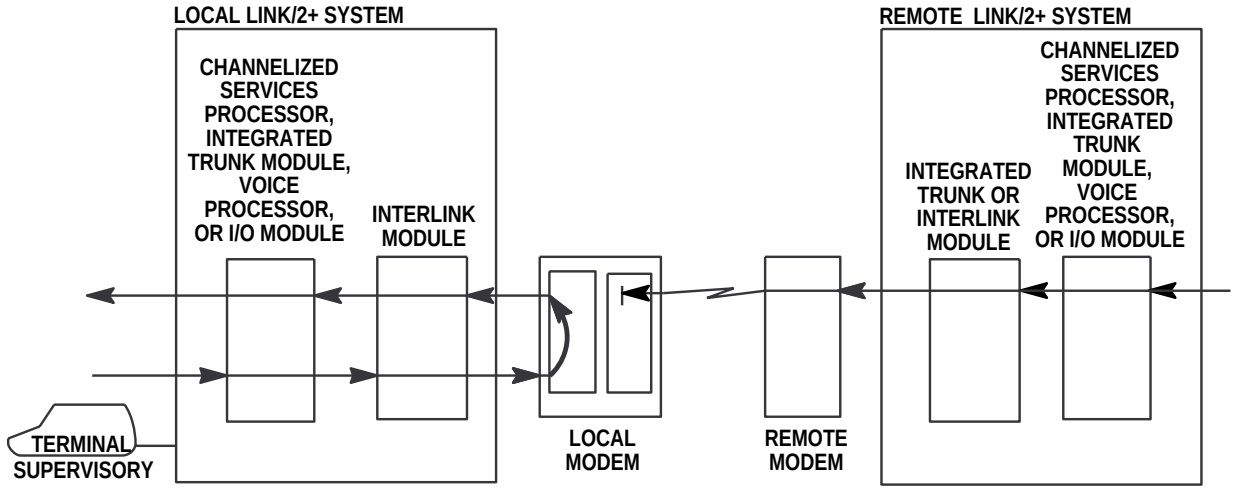
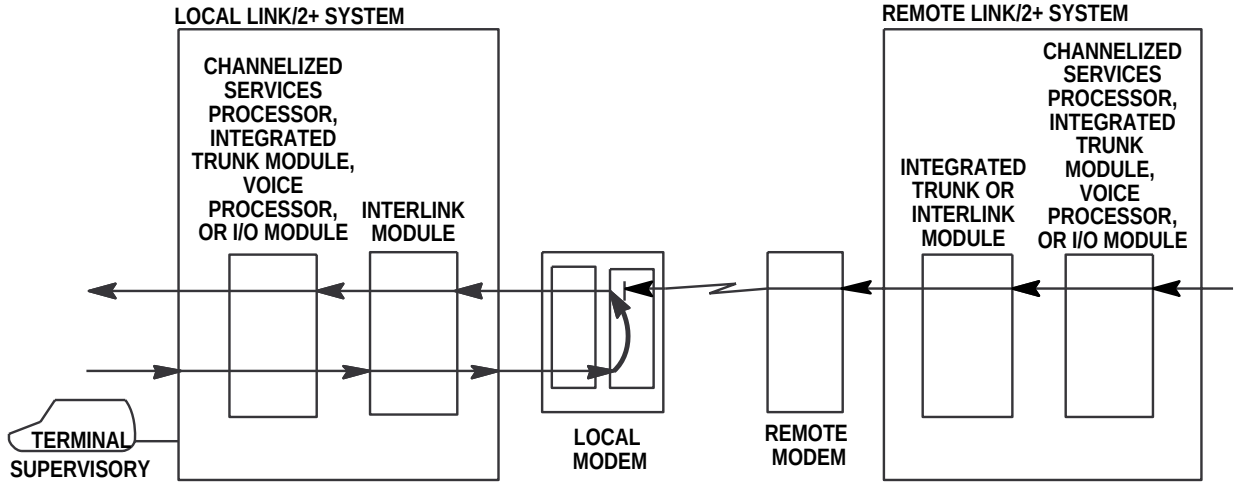

REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTEGRATED TRUNK OR INTERLINK MODULE
LFM.11 OR LFM.12 LINK FRAMING MODULE
TWO-TO-ONE
INTERMACHINE LINK
LOCAL LINK/2+ SYSTEM
INTERLINK MODULE
COMMAND: LP LA DL ss
E. LINE DRIVER IN TWO-TO-ONE MODE WITH BOTH INTERLINK MODULES GOING THROUGH LFM.11 OR LFM.12 LINK FRAMING MODULES PUT INTO LOCAL ANALOG LOOPBACK
SUPERVISORY TERMINAL

Figure 7-12. Local Digital and Local Analog Intermachine Link Loopbacks for Line Drivers (Sheet 5)


LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTERLINK MODULE
REMOTE LINK/2+ SYSTEM
INTEGRATED TRUNK OR INTERLINK MODULE
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
TERMINAL SUPERVISORY
LOCAL MODEM
REMOTE MODEM

A. COMMAND: LP LD DL ss


LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTERLINK MODULE
REMOTE LINK/2+ SYSTEM
INTEGRATED TRUNK OR INTERLINK MODULE
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
TERMINAL SUPERVISORY
LOCAL MODEM
REMOTE MODEM

B. COMMAND: LP LA DL ss

Figure 7-13. Local Digital and Local Analog Intermachine Link Loopbacks for Analog Modems

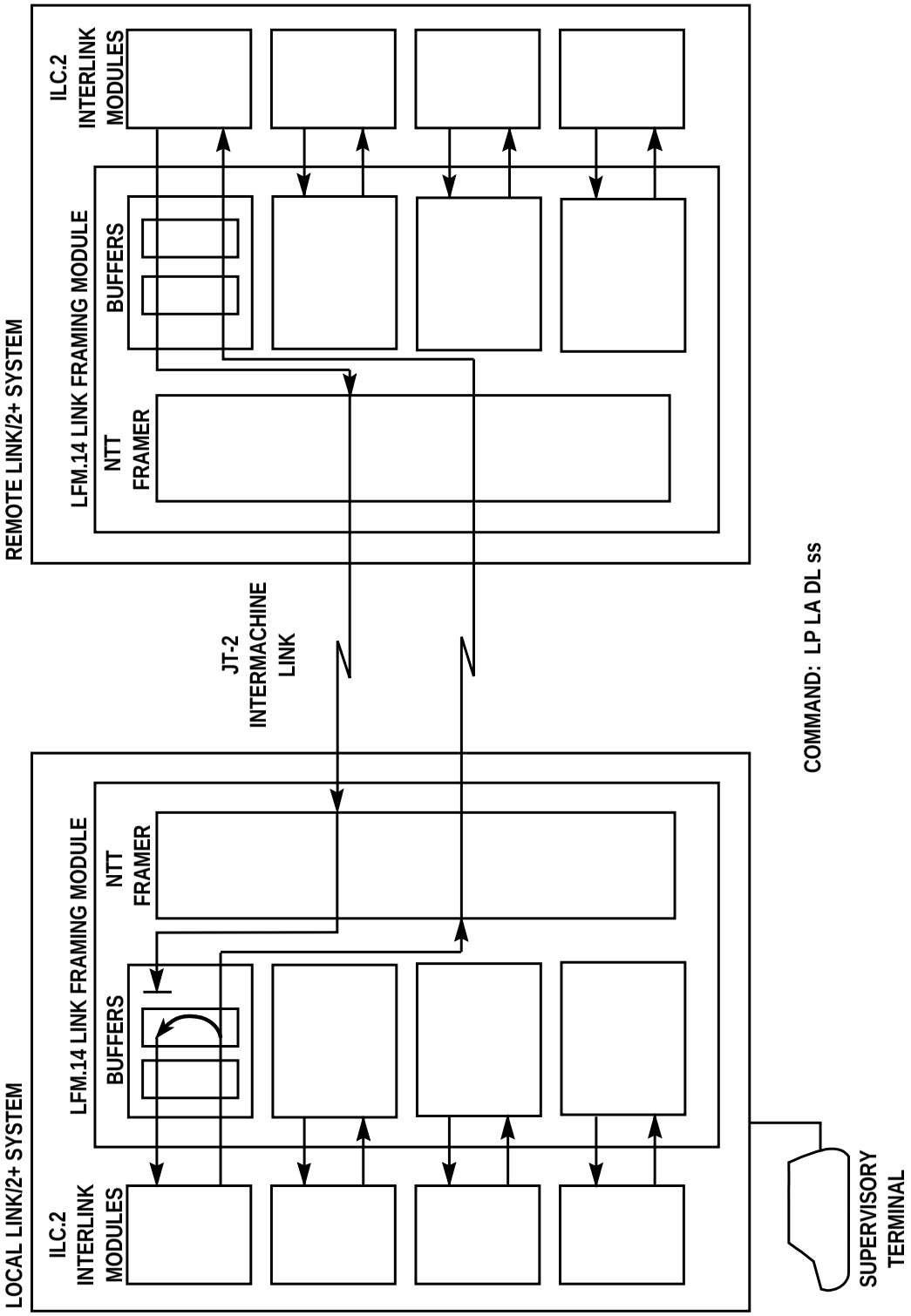


Figure 7-14. Local Analog Loopback for LFM.14 Link Framing Module (Low Speed Port)

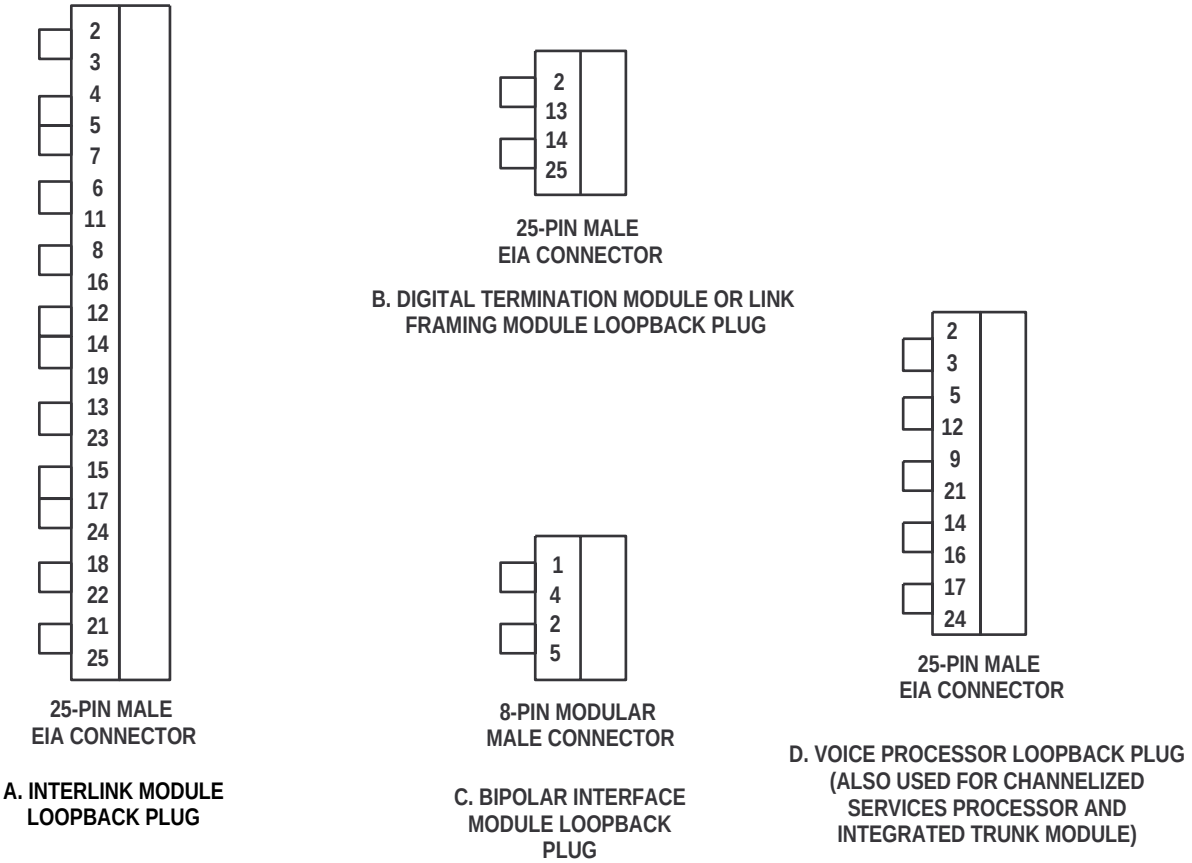


Figure 7-15. Loopback Plugs

Remote Analog Intermachine Link Loopback

The LP RA DL command loops the circuit at the bipolar encoder/decoder of the remote line driver, Figure 7-16, or directs an external modem to loopback at the remote analog interface, Figure 7-17A.

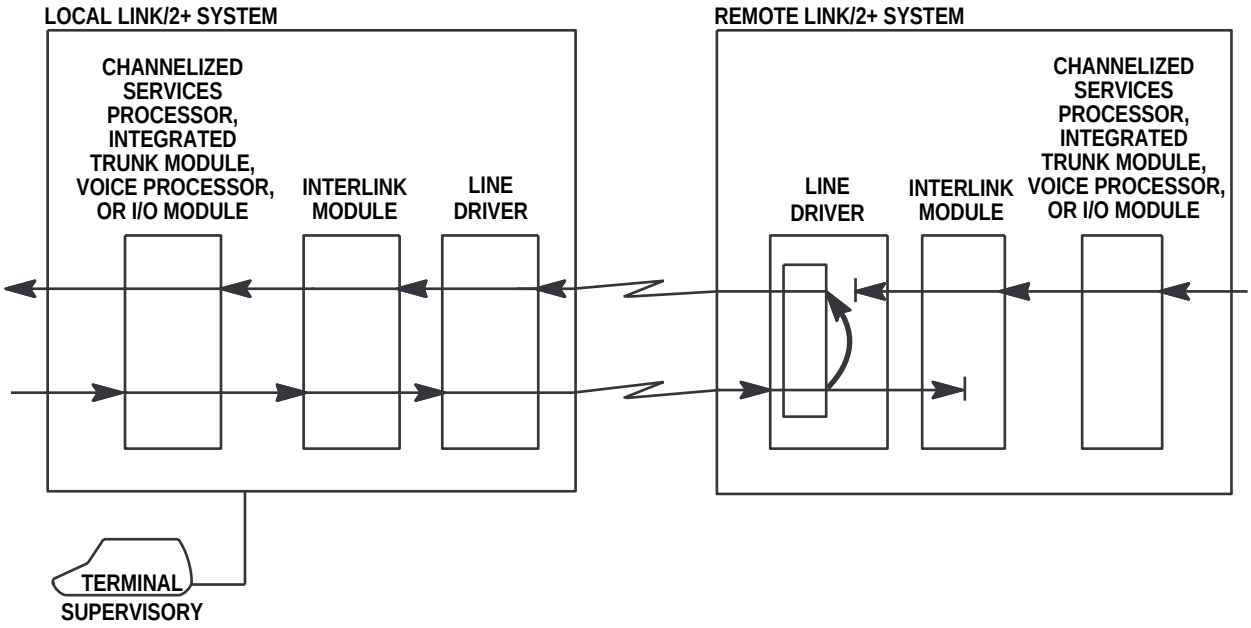

LOCAL LINK/2+ SYSTEM
REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTERLINK MODULE
LINE DRIVER
LINE DRIVER
INTERLINK MODULE
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
TERMINAL SUPERVISORY
COMMAND: LP RA DL ss or LP RD DL ss
A. LINE DRIVER IN ONE-TO-ONE MODE

Figure 7-16. Remote Analog and Remote Digital Intermachine Link Loopbacks for Line Drivers (Sheet 1 of 3)

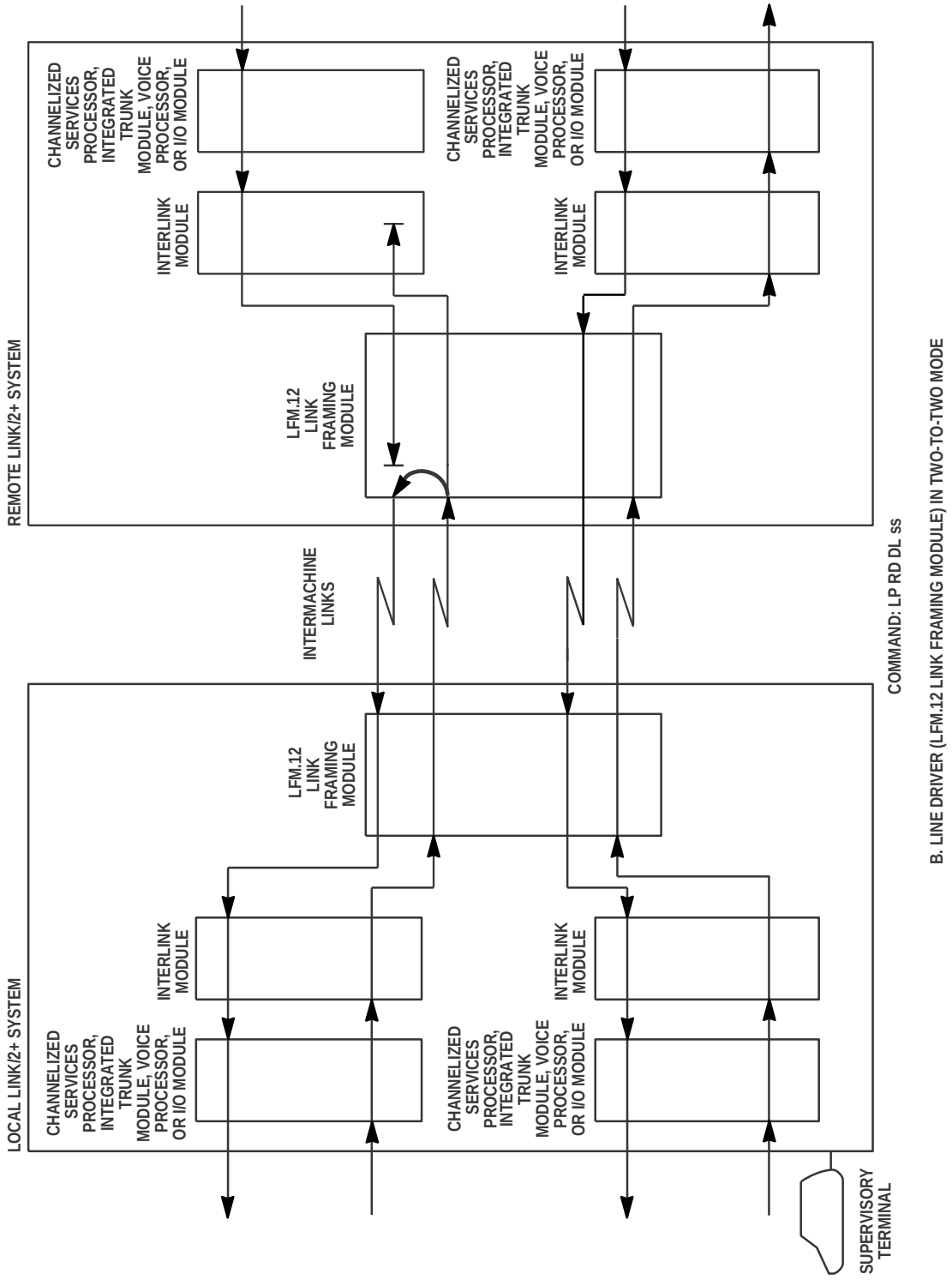

REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTERLINK MODULE
LFM.12 LINK FRAMING MODULE
INTERMACHINE LINKS
LOCAL LINK/2+ SYSTEM
COMMAND: LP RD DL ss
B. LINE DRIVER (LFM.12 LINK FRAMING MODULE) IN TWO-TO-TWO MODE
SUPERVISORY TERMINAL

Figure 7-16. Remote Analog and Remote Digital Intermachine Link Loopbacks for Line Drivers (Sheet 2)

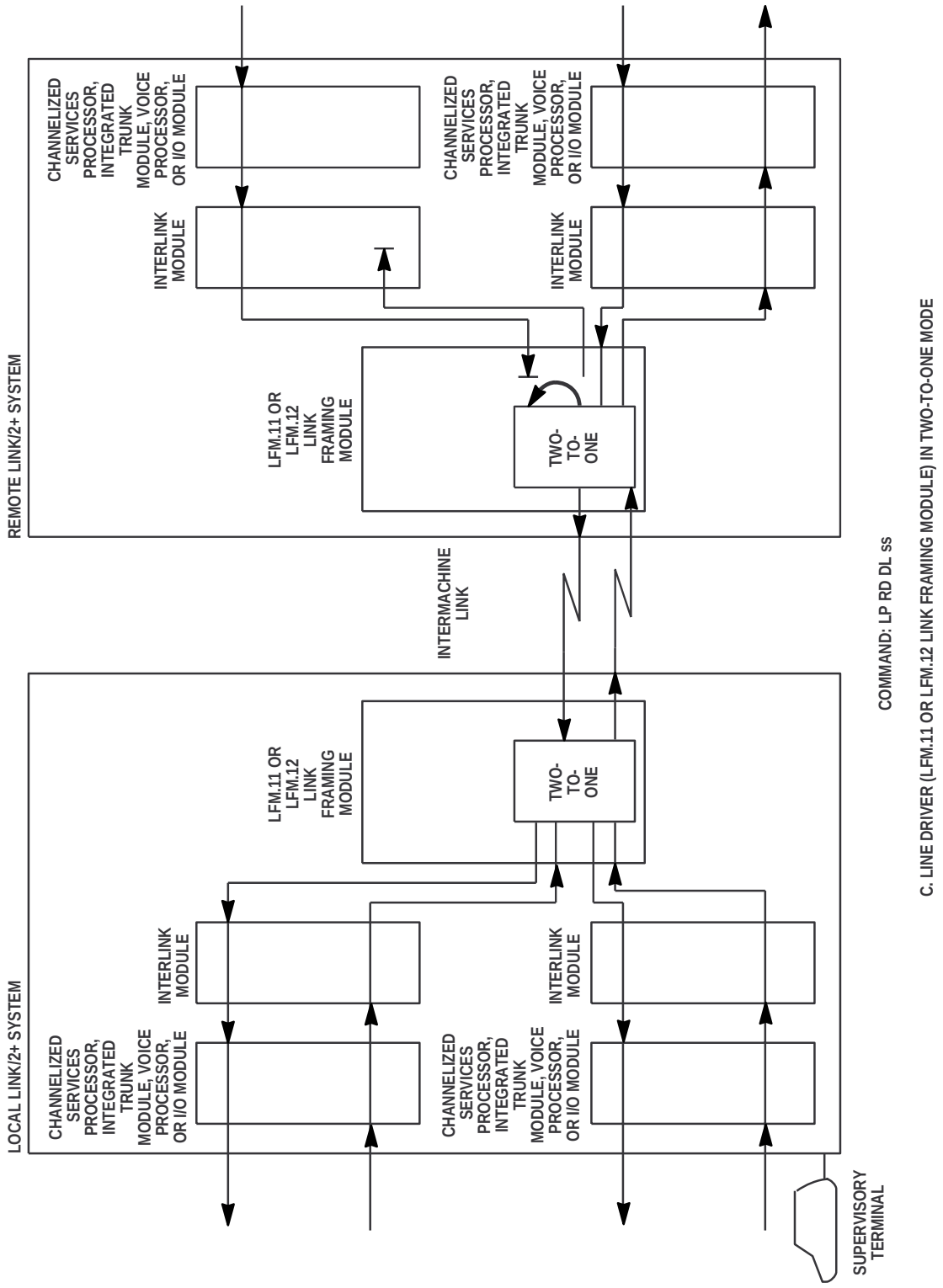
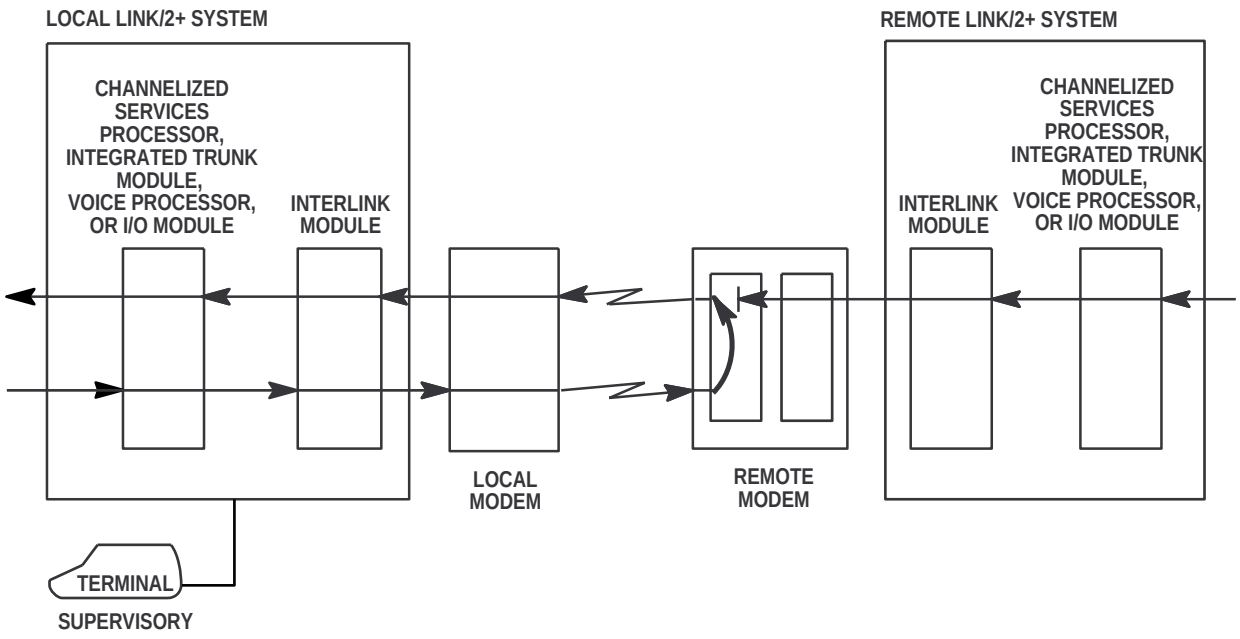
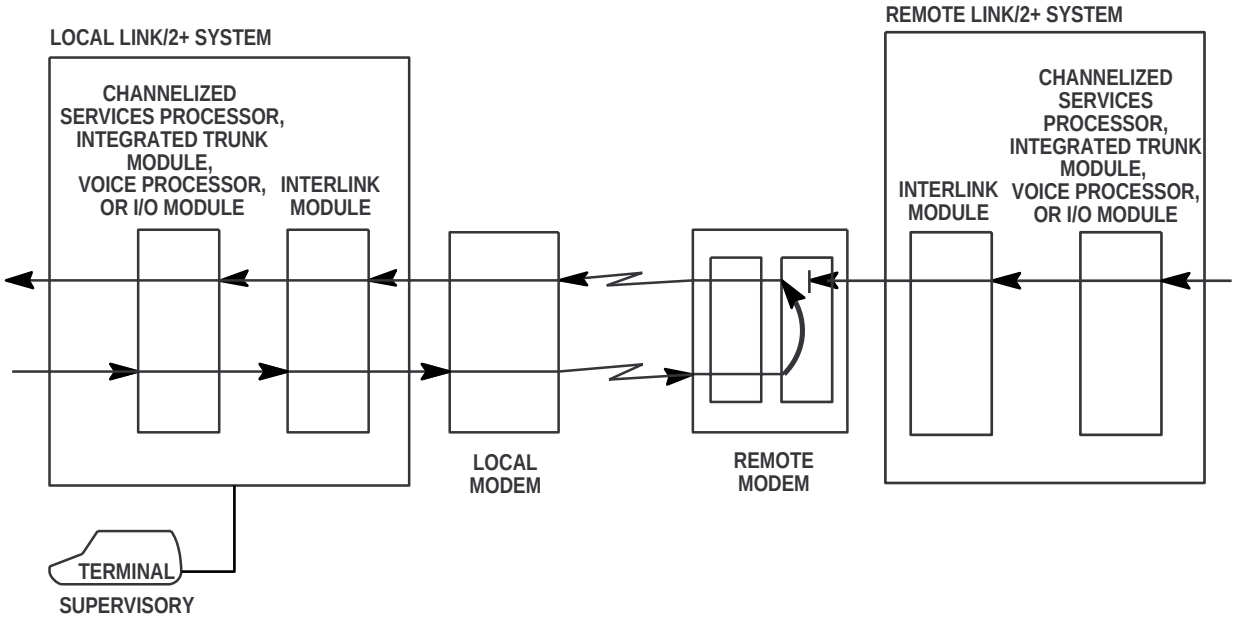

REMOTE LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR I/O MODULE
INTERLINK MODULE
LFM.11 OR LFM.12 LINK FRAMING MODULE
TWO-TO-ONE
INTERMACHINE LINK
LOCAL LINK/2+ SYSTEM
SUPERVISORY TERMINAL
COMMAND: LP RD DL ss
C. LINE DRIVER (LFM.11 OR LFM.12 LINK FRAMING MODULE) IN TWO-TO-ONE MODE

Figure 7-16. Remote Analog and Remote Digital Intermachine Link Loopbacks for Line Drivers (Sheet 3)



A. COMMAND: LP RA DL ss



B. COMMAND: LP RD DL ss

Figure 7-17. Remote Analog and Remote Digital Intermachine Link Loopbacks for Analog Modems

Remote Digital Intermachine Link Loopback

The LP RD DL command loops the circuit at the bipolar encoder/decoder of the remote line driver, Figure 7-16, directs an external modem to loopback at the remote digital interface, Figure 7-17B, or loops the circuit at the buffer of the remote LFM.14 Link Framing Module, Figure 7-18.

NOTE: *On Digital Termination Modules and Link Framing Modules, the LP RA DL and LP RD DL commands loop the intermachine link at the same location.*

Remote Bus Intermachine Link Loopback

The LP RB DL command loops the circuit at the bus of the remote Interlink Module, Figure 7-19.

NOTE: *When the command NOD xxxx LP RB DL is directed to the node at the other end of the intermachine link, the local node Interlink Module is placed in bus loopback. This loopback can be cleared from the remote node using the CLR DL ss command or from the local node using the RST 1:ss command, where ss equals the slot position of the Interlink Module in loopback.*

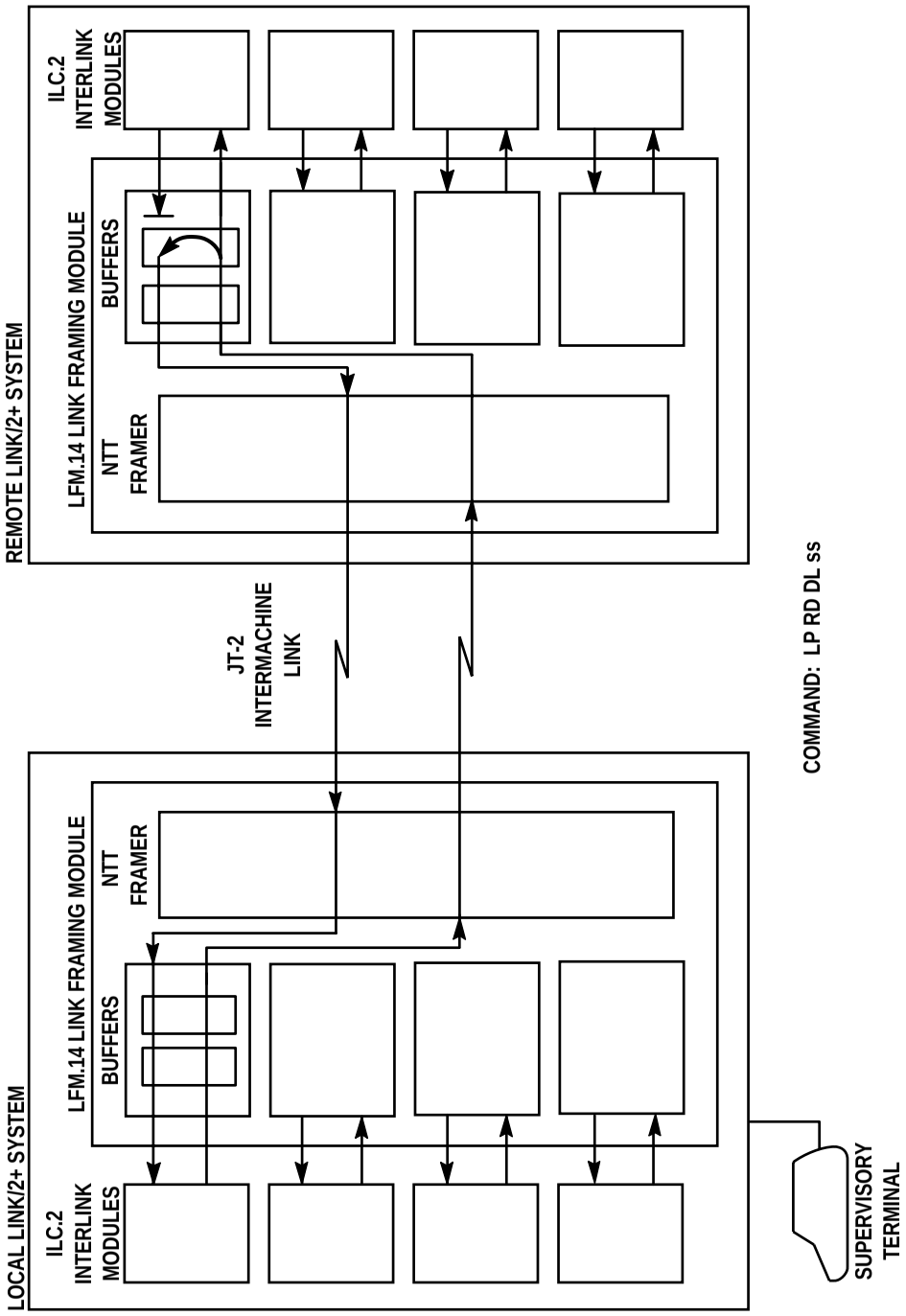


Figure 7-18. Remote Digital Loopback for LFM.14 Link Framing Module (Low Speed Port)

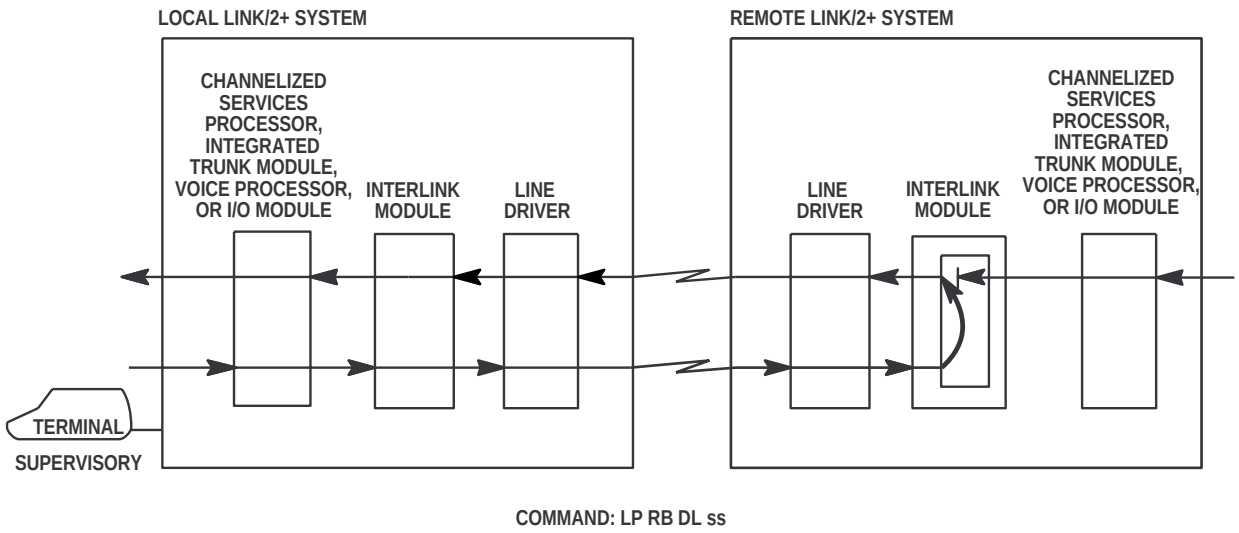


Figure 7-19. Remote Bus Intermachine Link Loopback

Loop DS-0 Channel and Clear DS-0 Channel Loop (LP DS0, CLR DS0) Commands

The LP DS0 command places specified DS-0 channel(s) or bundled channels of specified master in loopback. The CLR DS0 command clears specified DS-0 channel(s) or any associated D-channel(s) or V-channel(s) from loopback, restoring channels to normal operation. This command does not center the phasor. Use the CEN PHS command to center phasor(s) of the specified DS-0 channel(s). When the CLR DS0 command is issued to a member of a bundle, all associated members of the bundle are cleared of DS-0 loopback.

AB bit signaling is ignored and timers are reset for all bandwidth contention DS-0 channels in loopback. Contending channels will not automatically connect and disconnect.

Commands:

[NOD xxxx] LP DS0 *loopback* **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}[{**/mmm *or* /P**}]**

[NOD xxxx] CLR DS0 **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

where *loopback* is one of the following:

EQ = channel phasor loopback toward the DS-1 (or E-1) trunk, that is, toward the external equipment

LI = channel phasor loopback toward an Interlink Module, I/O module, Integrated Trunk Module, Voice Processor, or Channelized Services Processor via the system bus, that is, toward the LINK network

BI = channel phasor bidirectional loopback
RA = remote analog loopback of remote line driver of the remote Interlink Module
RB = remote Integrated Trunk Module bus loopback
RD = remote digital loopback of remote line driver of the remote Interlink Module
VS = used with channels serviced by a Voice Server Module. Places associated V-channel in bidirectional loopback

and where:

/mmm = number of minutes (1-240) after which loopback is cleared automatically (default is 2 minutes)

/P = permanent; loopback will not be cleared automatically (option not valid for remote Integrated Trunk Module proprietary bundle or Interlink Module)

NOTES: *The /mmm option does not apply to VS loopbacks. The /P option, however, is a* ***required*** *modifier for VS loopbacks.*

No warning is provided if VS loopback is specified and channel is not processed by a Voice Server Module.

The remote LP DS0 EQ command NOD xxxx LP DS0 EQ cannot be used for remote connected Voice Processor, Integrated Trunk Module, and Channelized Services Processor DS-0 channels or bundles.

After the LP DS0 command is entered, the supervisory port displays the loopback status of the DS-0 channels, Figure 7-20.

To test a local DS-0 channel that connects locally to an I/O module using the local test generator and test detector:

NOTE: *The internal test generator and detector cannot be used with the Voice Server Module. For those loopback tests, use external test equipment.*

- Loop the I/O module channel toward the DS-0 channel using the LP CH command.
- Loop the DS-0 channel toward the I/O module channel using the LP DS0 command.
- Use the TST R command to initiate a test message that is looped first by the I/O module and passed to the Voice Processor or Channelized Services Processor. The Voice Processor or Channelized Services Processor loops the test message at the DS-0 channel phasor back to test detector.

To test a local DS-0 channel that connects locally to another DS-0 channel using the tone generator on the Voice Processor or Channelized Services Processor:

- Loop the DS-0 channel at one of the Voice Processors or Channelized Services Processors using the LP DS0 command.
- Use the SET TON command on the other Voice Processor or Channelized Services Processor to initiate a test tone toward the looped DS-0 channel. The looped DS-0 channel returns the test tone to the unlooped DS-0 channel.

```
N0058> LP DS0 EQ 1:10:1/4
DS0       1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16
LP STA    EQ  RE  NL  NL  VS  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL
LP TIM    004 005 000 000 005 000 000 000 000 000 000 000 000 000 000 000

DS0       17  18  19  20  21  22  23  24  25  26  27  28  29  30  31  32
LP STA    NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL  NL
LP TIM    000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
```

Parameters are set via command line and results are displayed:

DSO - DS-0 channel number

LP STA - Loopback status of DS-0 channel, where:

- **EQ =** Loopback toward external equipment established
- **LI =**Loopback toward LINK/2+ network established
- **BI =** Bidirectional loopback established
- **RA =** Remote Integrated Trunk Module analog loopback
- **RB =** Remote Integrated Trunk Module bus loopback
- **RD =** Remote Integrated Trunk Module digital loopback
- **RE =** Remote equipment busy out
- **VS =** Voice Server Module V-channel loopback
- **NL =** DS-0 channel not in loopback

LP TIM - Time duration for established loopback

Figure 7-20. Typical Loop DS-0 Channel (LP DS0) Command

- Use external test equipment to monitor the tone received by the unlooped DS-0 channel.

To test a local DS-0 channel that connects across an intermachine link to a remote I/O module using the remote test generator and test detector:

- Loop the I/O module channel toward the local node using the NOD xxxx LP CH command.
- Loop the DS-0 channel toward the remote node using the LP DS0 command.
- Use the NOD xxxx TST R command to initiate a test message that is looped first by the remote I/O module and passed across an intermachine link to the local DS-0 channel in loopback. The DS-0 channel returns the test message to the remote node via an intermachine link where the message is received by the remote test detector.

To test a local DS-0 channel that connects across an intermachine link to a remote DS-0 channel using the tone generator on the remote Voice Processor or Channelized Services Processor:

- Loop the local DS-0 channel toward the remote channel using the LP DS0 command.
- Use the NOD xxxx SET TON command to initiate a test tone that passes across the intermachine link to the local DS-0 channel in loopback.
- Use external test equipment at the remote node to monitor the looped tone.

NOTE: *If the channel is an ILP contention channel, the channel must be disconnected, the connect type reprogrammed at both ends as originator/terminator, and reconnected before proceeding with the above steps.*

Equipment Loopback

The LP DS0 EQ command loops the specified DS-0 channel circuit toward the DS-1 (or E-1) trunk (that is, toward the local equipment) at the phasor, Figure 7-21. The equipment loop can be tested by using the SET TON command or an external tone generator and an external tone monitor.

Provided that channel connections exist, executing the LP DS0 EQ command automatically issues the BSY command to busy out the remote end of the specified DS-0 channel(s). The remote DS-0 channel(s) will become busied out before the equipment loopback is established and will remain busied out for 1 minute after the loopback is removed.

If the BSY command cannot reach the remote node for any reason, such that the command hangs up the system, issue Control C characters from the keyboard until the supervisory port prompt (Nxxxx>) reappears.

AB bit signaling is ignored and timers are reset for all bandwidth contention DS-0 channels in loopback. Contending channels will not automatically connect and disconnect.

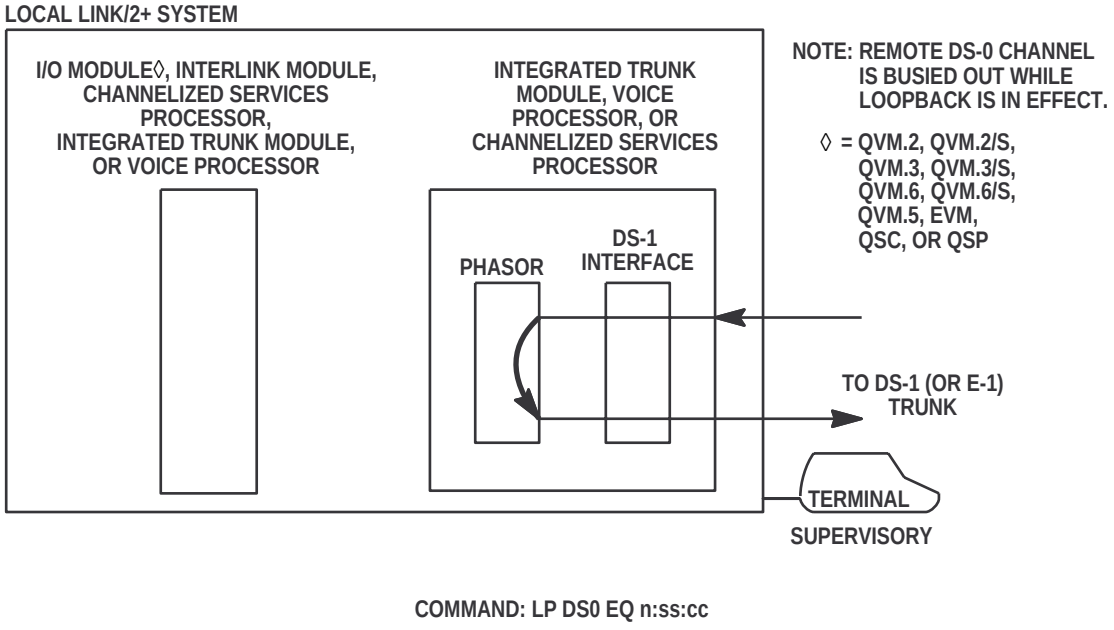

LOCAL LINK/2+ SYSTEM
I/O MODULE◊, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
PHASOR
DS-1 INTERFACE
NOTE: REMOTE DS-0 CHANNEL IS BUSIED OUT WHILE LOOPBACK IS IN EFFECT.
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP
TO DS-1 (OR E-1) TRUNK
TERMINAL
SUPERVISORY
COMMAND: LP DS0 EQ n:ss:cc

Figure 7-21. DS-0 Channel Equipment Loopback

LINK Interface Loopback

The LP DS0 LI command loops the specified DS-0 channel circuit at the phasor toward another module (that is, Interlink Module, I/O module, Voice Processor, Integrated Trunk Module, or Channelized Services Processor) via the system bus, Figure 7-22. The DS-0 channel toward the equipment is busied out while the loopback is in effect.

Bidirectional Loopbacks

The LP DS0 BI command loops the specified DS-0 channel circuit bidirectionally at the phasor, Figure 7-23.

Remote Analog Integrated Trunk Module Loopback

The LP DS0 RA command initiates an analog loop of the remote line driver of the remote Interlink Module, Figure 7-24.

Remote Bus Integrated Trunk Module Loopback

The LP DS0 RB command initiates a bus loop at the remote Interlink Module, Figure 7-25.

Remote Digital Integrated Trunk Module Loopback

The LP DS0 RD command initiates a digital loop of the remote line driver of the remote Interlink Module, Figure 7-26.

Voice Server Bidirectional Loopbacks

The LP DS0 VS command is issued to a Voice Processor or Integrated Trunk Module DS-0 channel serviced by a Voice Server Module. This command places the associated V-channel on the Voice Server Module in bidirectional loopback. The V-channel PCM phasor data is looped back towards the Voice Processor or Integrated Trunk Module while the processed phasor data is looped back towards the Interlink Module or Integrated Trunk Module, Figure 7-27.

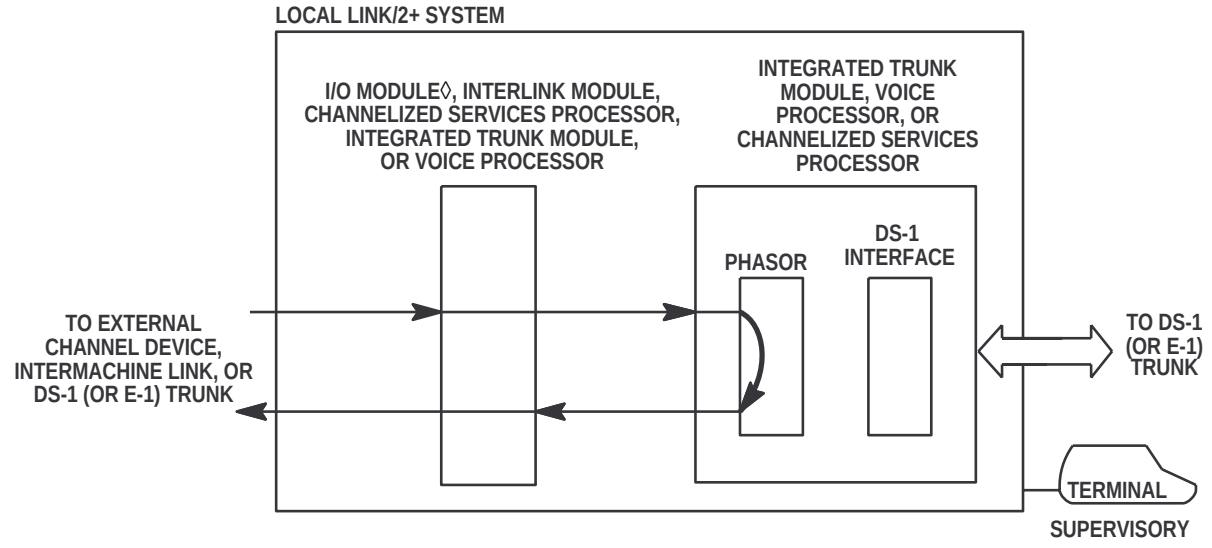

LOCAL LINK/2+ SYSTEM
I/O MODULE◊, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
PHASOR
DS-1 INTERFACE
TO EXTERNAL CHANNEL DEVICE, INTERMACHINE LINK, OR DS-1 (OR E-1) TRUNK
TO DS-1 (OR E-1) TRUNK
TERMINAL SUPERVISORY
COMMAND: LP DS0 LI n:ss:cc
NOTE: LOCAL DS-0 CHANNEL IS BUSIED OUT WHILE LOOPBACK IS IN EFFECT.
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP

Figure 7-22. DS-0 Channel Link Interface Loopback

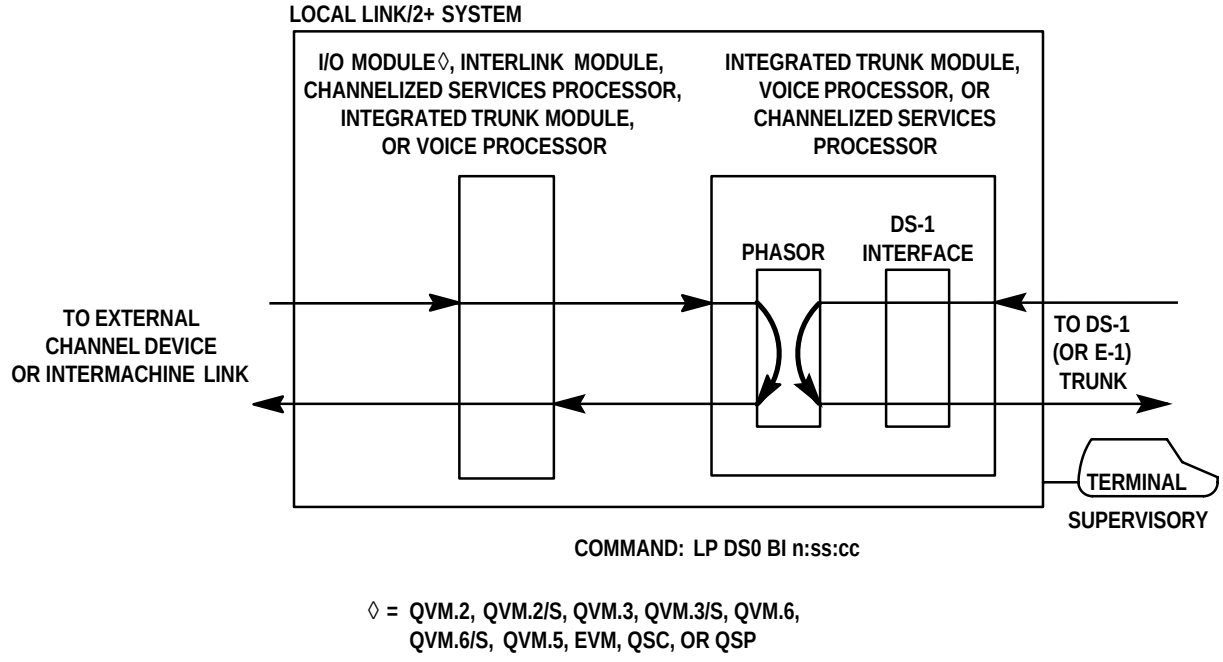

LOCAL LINK/2+ SYSTEM
I/O MODULE◊, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
PHASOR
DS-1 INTERFACE
TO EXTERNAL CHANNEL DEVICE OR INTERMACHINE LINK
TO DS-1 (OR E-1) TRUNK
TERMINAL SUPERVISORY
COMMAND: LP DS0 BI n:ss:cc
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP

Figure 7-23. Bidirectional DS-0 Channel Loopback

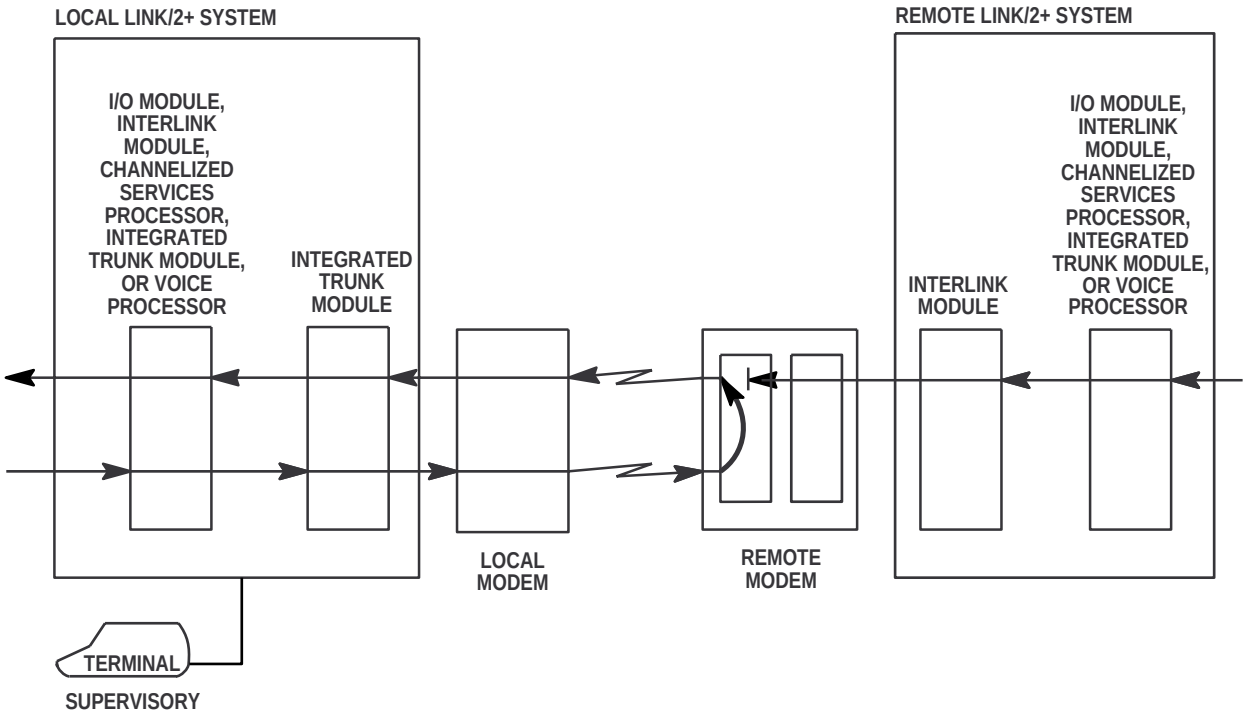

LOCAL LINK/2+ SYSTEM
REMOTE LINK/2+ SYSTEM
I/O MODULE, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
INTEGRATED TRUNK MODULE
INTERLINK MODULE
I/O MODULE, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
LOCAL MODEM
REMOTE MODEM
TERMINAL
SUPERVISORY
COMMAND: LP DS0 RA n:ss:cc

Figure 7-24. Remote Analog Integrated Trunk Module Loopback

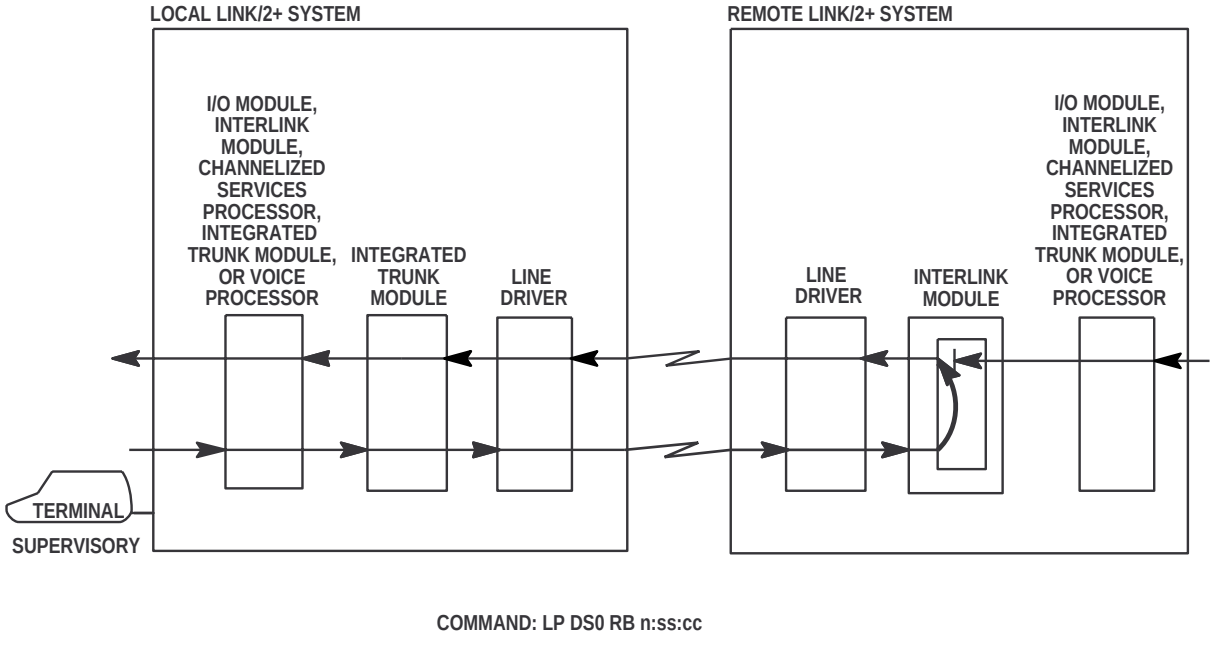

LOCAL LINK/2+ SYSTEM
REMOTE LINK/2+ SYSTEM
I/O MODULE, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
INTEGRATED TRUNK MODULE
LINE DRIVER
LINE DRIVER
INTERLINK MODULE
I/O MODULE, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
TERMINAL
SUPERVISORY
COMMAND: LP DS0 RB n:ss:cc

Figure 7-25. Remote Bus Integrated Trunk Module Loopback

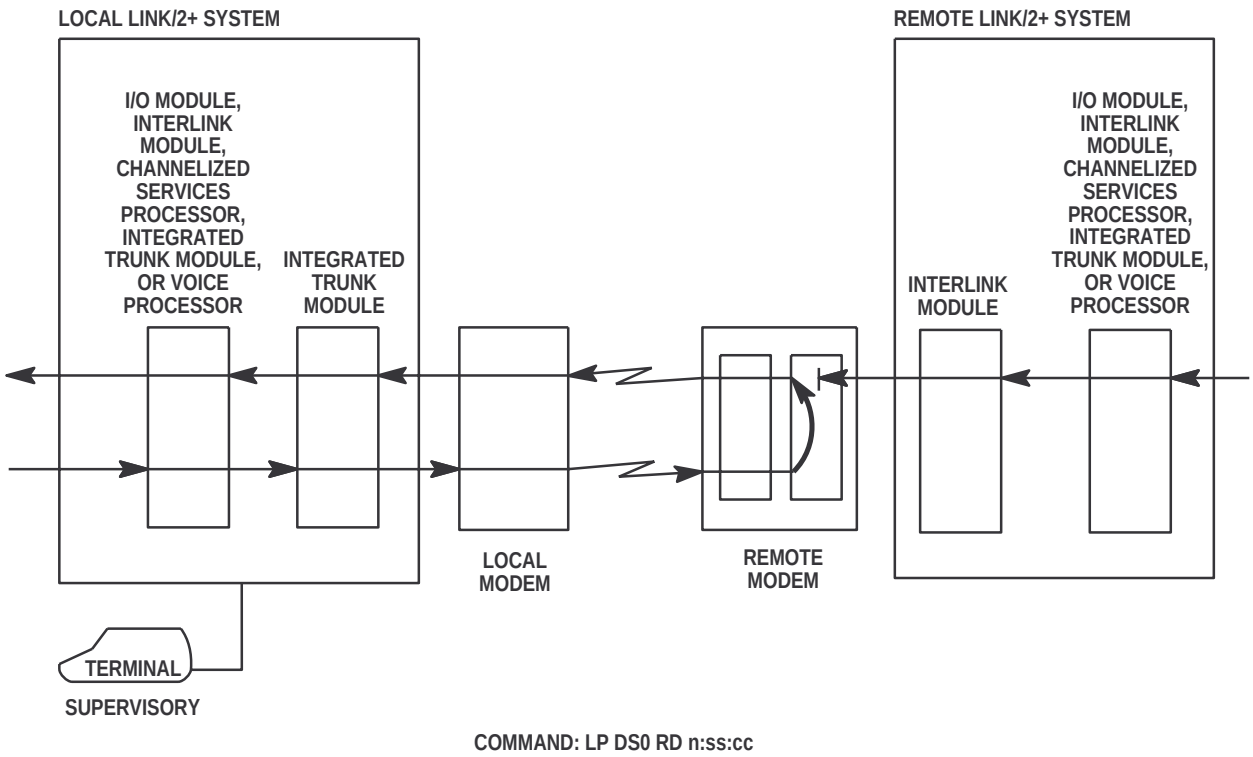

LOCAL LINK/2+ SYSTEM
REMOTE LINK/2+ SYSTEM
I/O MODULE, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
INTEGRATED TRUNK MODULE
INTERLINK MODULE
I/O MODULE, INTERLINK MODULE, CHANNELIZED SERVICES PROCESSOR, INTEGRATED TRUNK MODULE, OR VOICE PROCESSOR
LOCAL MODEM
REMOTE MODEM
TERMINAL
SUPERVISORY
COMMAND: LP DS0 RD n:ss:cc

Figure 7-26. Remote Analog and Remote Digital Integrated Trunk Module Loopbacks for Analog Modems

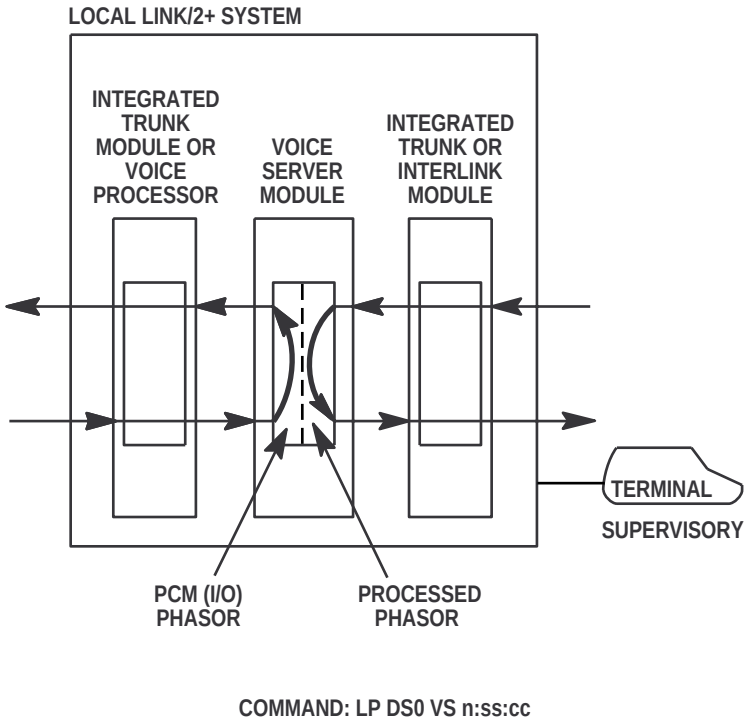


Figure 7-27. Voice Server Module Bidirectional Loopback

Loop DS-1/E-1 Trunk and Clear Trunk Loop (LP DS1, CLR DS1) Commands

The LP DS1 command places the DS-1 (or E-1) interface(s) on specified Voice Processor(s), Integrated Trunk Module(s), or Channelized Services Processor(s) in loopback. The CLR DS1 command clears DS-1 (or E-1) interface(s) on specified Voice Processor(s), Integrated Trunk Module(s), or Channelized Services Processor(s) from DS-1 (or E-1) and network interface loopback and resets the out-of-frame counter.

Command:

[NOD xxxx] LP DS1 *loopback* **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}[{**/mmm *or* /P**}]**

where *loopback* is one of the following:

EQ	=	loopback toward the DS-1 (or E-1) trunk, that is, toward the external equipment
LI	=	loopback away from the DS-1 (or E-1) trunk, that is, toward the LINK network
BI	=	bidirectional DS-1 (or E-1) interface loopback

and where:

/mmm	=	number of minutes (1-240) after which loopback is cleared automatically (default is 2 minutes)
/P	=	permanent; loopback will not be cleared automatically (option not valid for remote command to an Integrated Trunk Module)

[NOD xxxx] CLR DS1 **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

Equipment Loopback

The LP DS1 EQ command, Figure 7-28, loops the incoming DS-1 (or E-1) signal toward the trunk at the DS-1 (or E-1) interface, Figure 7-29. All DS-0 channels on the specified trunk must be disconnected before this loopback command is entered, and reconnected following the loopback test.

For Voice Processors and Channelized Services Processors, if any affected DS-0 channels are connected when the LP DS1 EQ command is issued, the command will be rejected and the message "CHANNELS ARE CONNECTED, CMD ABORTED" will be displayed. Also, if a command is issued to connect a DS-0 channel while the equipment loopback is in effect, the command will be rejected. A subsequent display of DS-0 channel connections will show a DISC ALARM indication.

```
N0020> LP DS1 EQ 1:9/7
ILP  1:15
LOOP : EQ   TIME : 002
```

Parameters are set via command line and results are displayed:

ILP 1:9 - Voice Processor in loopback (CSP displayed for Channelized Services Processor in loopback or ILQ displayed for Integrated Trunk Module in loopback)

LOOP: - Loopback status of DS-1 trunk, where:

EQ = Loopback toward external equipment established

LI = Loopback toward LINK/2+ network established

BI = Bidirectional loopback established

TIME: - Time duration (in minutes) for established loopback

Figure 7-28. Typical Loop DS-1 Trunk (LP DS1) Command

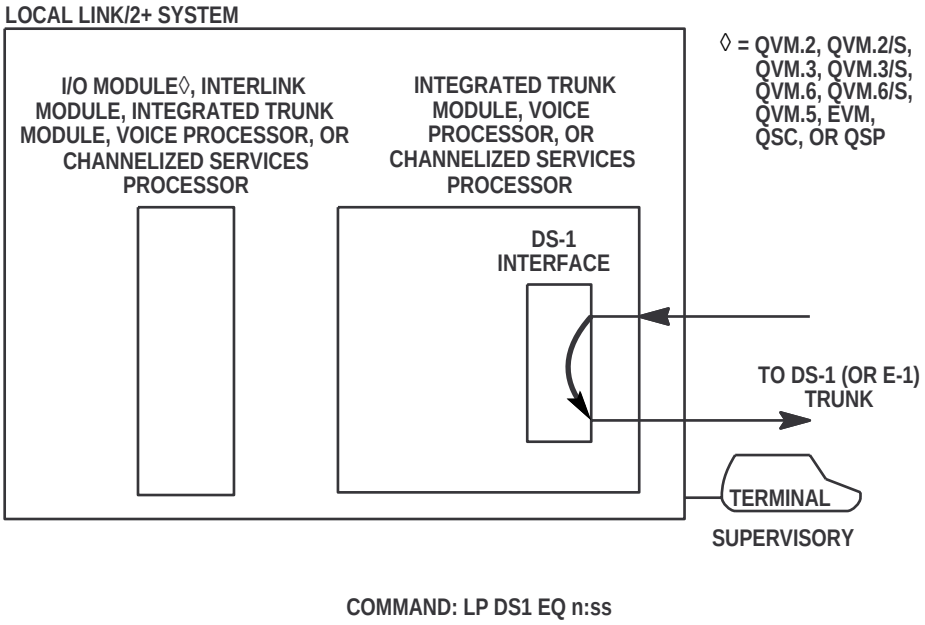

LOCAL LINK/2+ SYSTEM
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP
I/O MODULE◊, INTERLINK MODULE, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
DS-1 INTERFACE
TO DS-1 (OR E-1) TRUNK
TERMINAL SUPERVISORY
COMMAND: LP DS1 EQ n:ss

Figure 7-29. DS-1 Signal Equipment Loopback

LINK Interface Loopback

The LP DS1 LI command loops the outgoing DS-1 (or E-1) signal at the DS-1 (or E-1) interface toward another module via the system bus, Figure 7-30. The local trunk acts like an open circuit at the DS-1 (or E-1) interface while this loopback is in effect. The equipment connected to the trunk may detect an alarm condition.

Bidirectional Loopbacks

The LP DS1 BI command loops the DS-1 (or E-1) signal bidirectionally at the DS-1 (or E-1) interface, Figure 7-31.

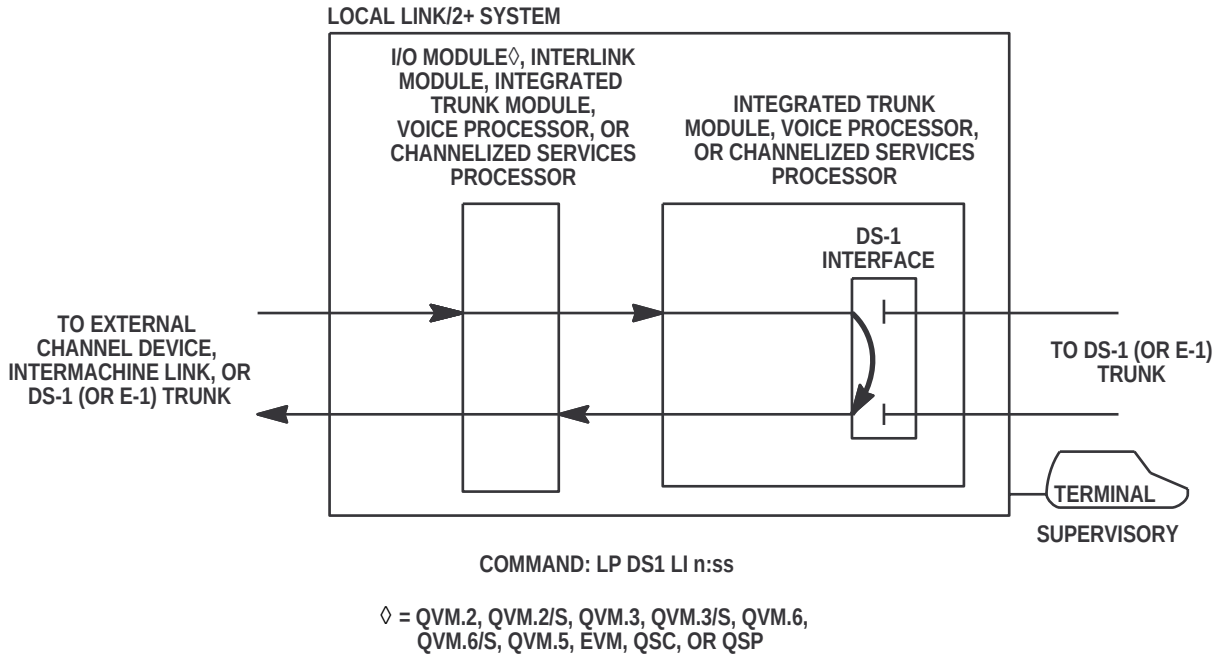

LOCAL LINK/2+ SYSTEM
I/O MODULE◊, INTERLINK MODULE, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
DS-1 INTERFACE
TO EXTERNAL CHANNEL DEVICE, INTERMACHINE LINK, OR DS-1 (OR E-1) TRUNK
TO DS-1 (OR E-1) TRUNK
TERMINAL SUPERVISORY
COMMAND: LP DS1 LI n:ss
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP

Figure 7-30. DS-1 Signal Link Interface Loopback

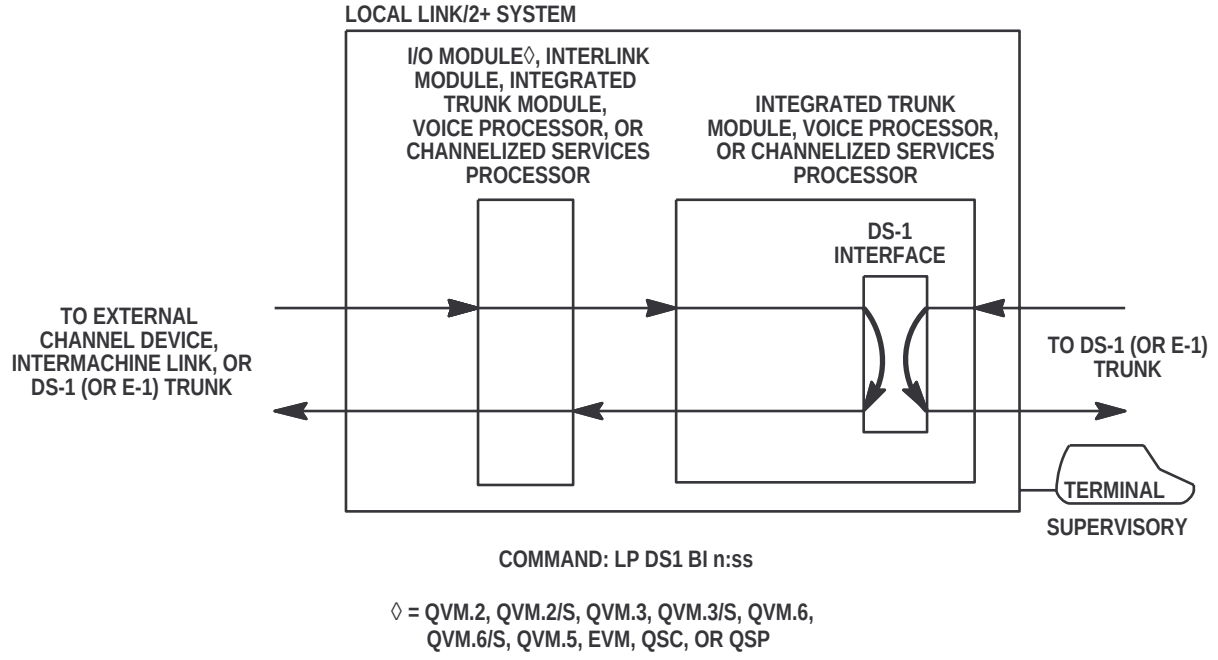

LOCAL LINK/2+ SYSTEM
I/O MODULE◊, INTERLINK MODULE, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
DS-1 INTERFACE
TO EXTERNAL CHANNEL DEVICE, INTERMACHINE LINK, OR DS-1 (OR E-1) TRUNK
TO DS-1 (OR E-1) TRUNK
TERMINAL SUPERVISORY
COMMAND: LP DS1 BI n:ss
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP

Figure 7-31. Bidirectional DS-1 Signal Loopback

Loop LFM and Clear LFM (LP LFM, CLR LFM) Commands

The LP LFM command places in loopback all intermachine links associated with the LFM.14 Link Framing Module specified by slot n:ss. An optional loopback time of between 1 and 15 minutes is permitted with the default time being 2 minutes. Optional permanent loopbacks are allowed locally.

The CLR LFM command clears the line driver (high speed port) of the specified LFM.14 Link Framing Module from loopback, restoring all ILC.2 Interlink Modules and/or all ILQ.1 Integrated Trunk Modules associated with the LFM.14 Link Framing Module to normal operation.

Commands:

[NOD xxxx] LP LFM *loopback* **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}[{**/mm *or* /P**}]**

where *loopback* is one of the following:

LK = loopback at line driver toward Link Framing Module

LLB = loopback at line driver toward the JT-2 trunk (ILQ.1 Integrated Trunk Module only)

and where:

n:ss = slot location of LFM.14 Link Framing Module

/mm = number of minutes (1-15) after which loopback is cleared automatically (default is 2 minutes)

/P = permanent; loopback will not be cleared automatically. Cannot be used for loopbacks issued to a remote node.

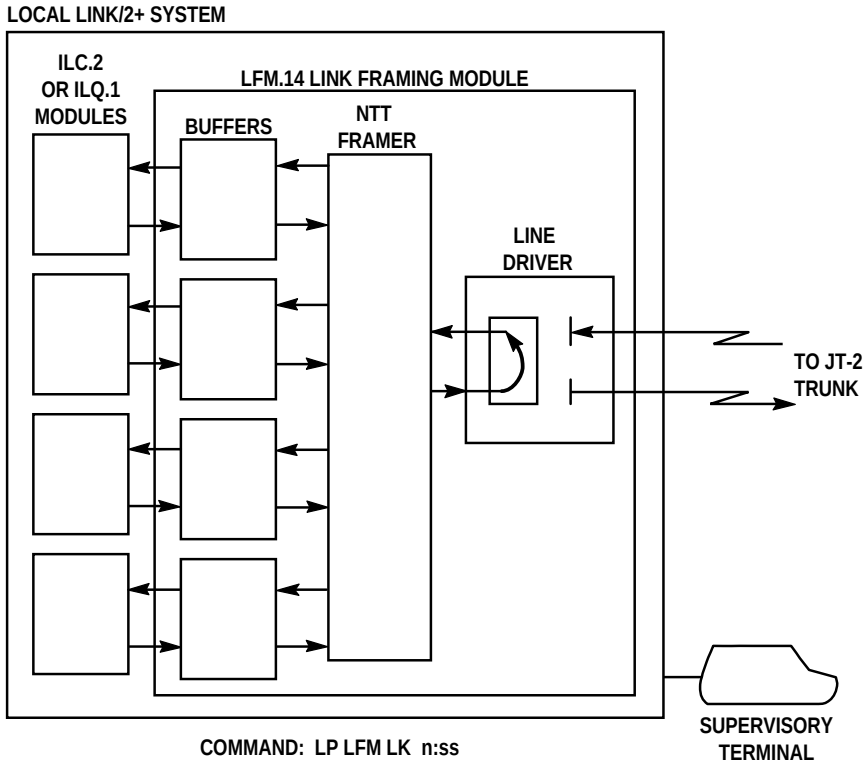
[NOD xxxx] CLR LFM **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}**

where:

n:ss = slot location of LFM.14 Link Framing Module

The LP LFM LK command loops the outgoing JT-2 signal towards the LINK/2+ System at the line driver, Figure 7-32A. The local trunk acts like an open circuit while the loopback is in effect. The equipment connected to the trunk may detect an alarm condition. All intermachine links supported by the LFM.14 Link Framing Module will be placed in loopback when this command is entered.

The LP LFM LLB command loops the incoming JT-2 signal toward the trunk at the LFM.14 Module line driver, Figure 7-32B. All intermachine links supported by the LFM.14 Link Framing Module will be placed in loopback when this command is entered.



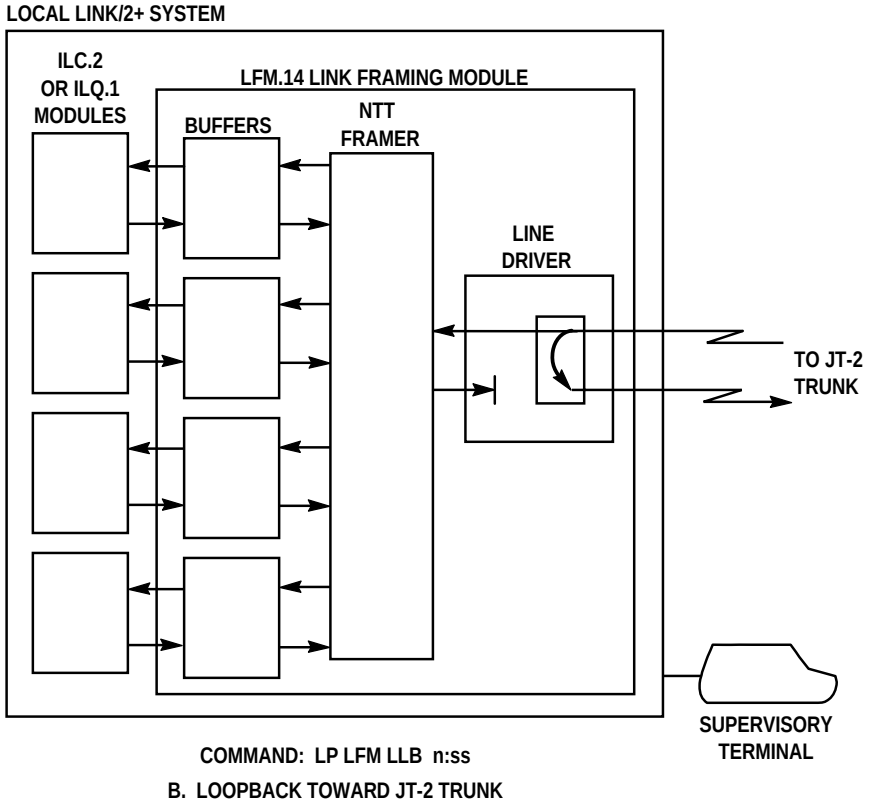


Figure 7-32. High Speed Port Loopbacks for LFM.14 Link Framing Module

Loop Network Interface (LP NI) Command

The LP NI command places the DS-1 (or E-1) trunk on specified Voice Processor(s), Integrated Trunk Module(s), or Channelized Services Processor(s) in loopback at the line driver, that is, Bipolar Interface Module, Digital Termination Module, or Link Framing Module.

The CLR DS1 command clears the DS-1 (or E-1) trunk from loopback at the line driver. See "Loop DS-1/E-1 Trunk and Clear Trunk Loop (LP DS1, CLR DS1) Commands" paragraph.

Command:

[NOD xxxx] LP NI *loopback* **{*** *or* n:ss[-n:ss]...**[**,n:ss[-n:ss]**]}[{**/mmm *or* /P**}]**

where *loopback* is one of the following:

LK	=	loopback at line driver toward the Voice Processor, Integrated Trunk Module, or Channelized Services Processor
LLB	=	loopback at line driver toward the DS-1 (or E-1) trunk

and where:

/mmm	=	number of minutes (1-240) after which loopback is cleared automatically (default is 2 minutes)
/P	=	permanent; loopback will not be cleared automatically

For Voice Processor, Integrated Trunk Module, or Channelized Services Processor, the LP NI LK command loops the outgoing DS-1 (or E-1) signal toward the Voice Processor, Integrated Trunk Module, or Channelized Services Processor at the bipolar encoder/decoder on the line driver, Figure 7-33. The local trunk acts like an open circuit at the line driver while the loopback is in effect. The equipment connected to the trunk may detect an alarm condition. If the line driver does not accept LINK/2+ System loopback commands, use a loopback plug, Figure 7-15D, on the Voice Processor, Integrated Trunk Module, or Channelized Services Processor.

For LFM.14 Link Framing Module, the LP NI LK command loops the outgoing signal toward the ILQ.1 Integrated Trunk Module at the buffer of the local LFM.14 Link Framing Module, Figure 7-34.

For Voice Processor, Integrated Trunk Module, or Channelized Services Processor, the LP NI LLB command loops the incoming DS-1 (or E-1) signal toward the trunk at the bipolar encoder/decoder of the line driver, Figure 7-35.

PRECAUTION: ***For Integrated Trunk Modules, proprietary bundle channels will not automatically reconnect after the LP NI LLB loopback is cleared. All DS-0 channels on the specified trunk must be disconnected before this loopback command is entered and must be reconnected following the loopback test.***

For LFM.14 Link Framing Module, the LP NI LLB command loops the incoming signal toward the JT-2 trunk at the buffer of the local LFM.14 Link Framing Module, Figure 7-36.

AB bit signaling is ignored and timers are reset for all bandwidth contention DS-0 channels in loopback. Contending channels will not automatically connect and disconnect.

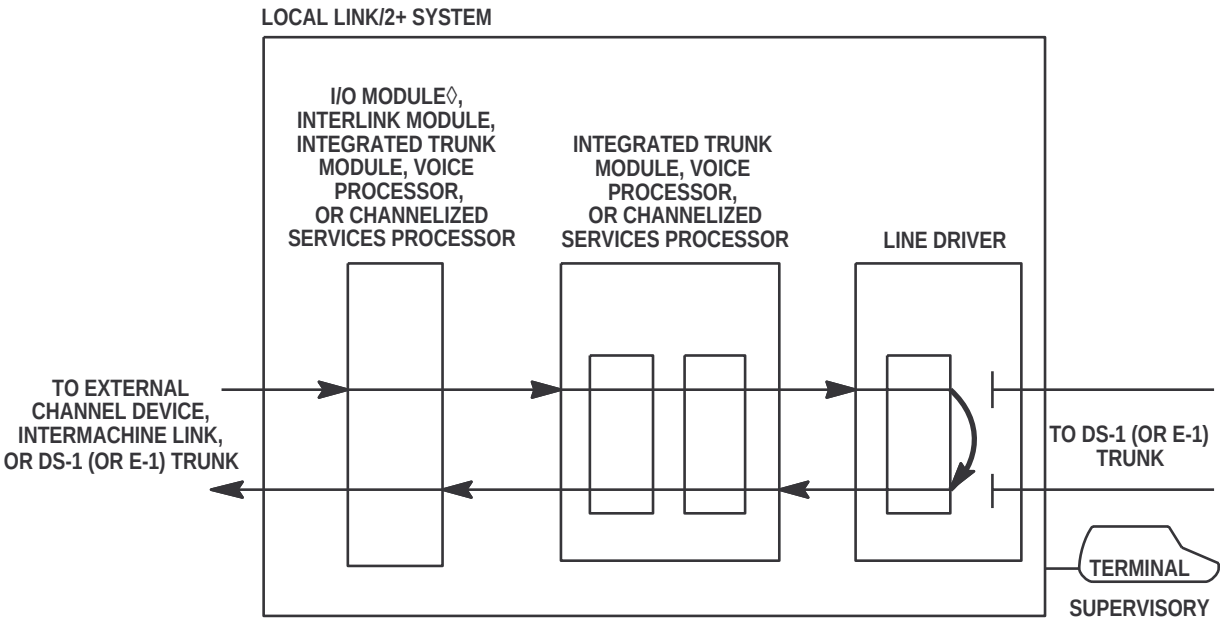

LOCAL LINK/2+ SYSTEM
I/O MODULE◊, INTERLINK MODULE, INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
LINE DRIVER
TO EXTERNAL CHANNEL DEVICE, INTERMACHINE LINK, OR DS-1 (OR E-1) TRUNK
TO DS-1 (OR E-1) TRUNK
TERMINAL SUPERVISORY
COMMAND: LP NI LK n:ss
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP

Figure 7-33. Network Interface Loopback Toward Voice Processor, Integrated Trunk Module, or Channelized Services Processor

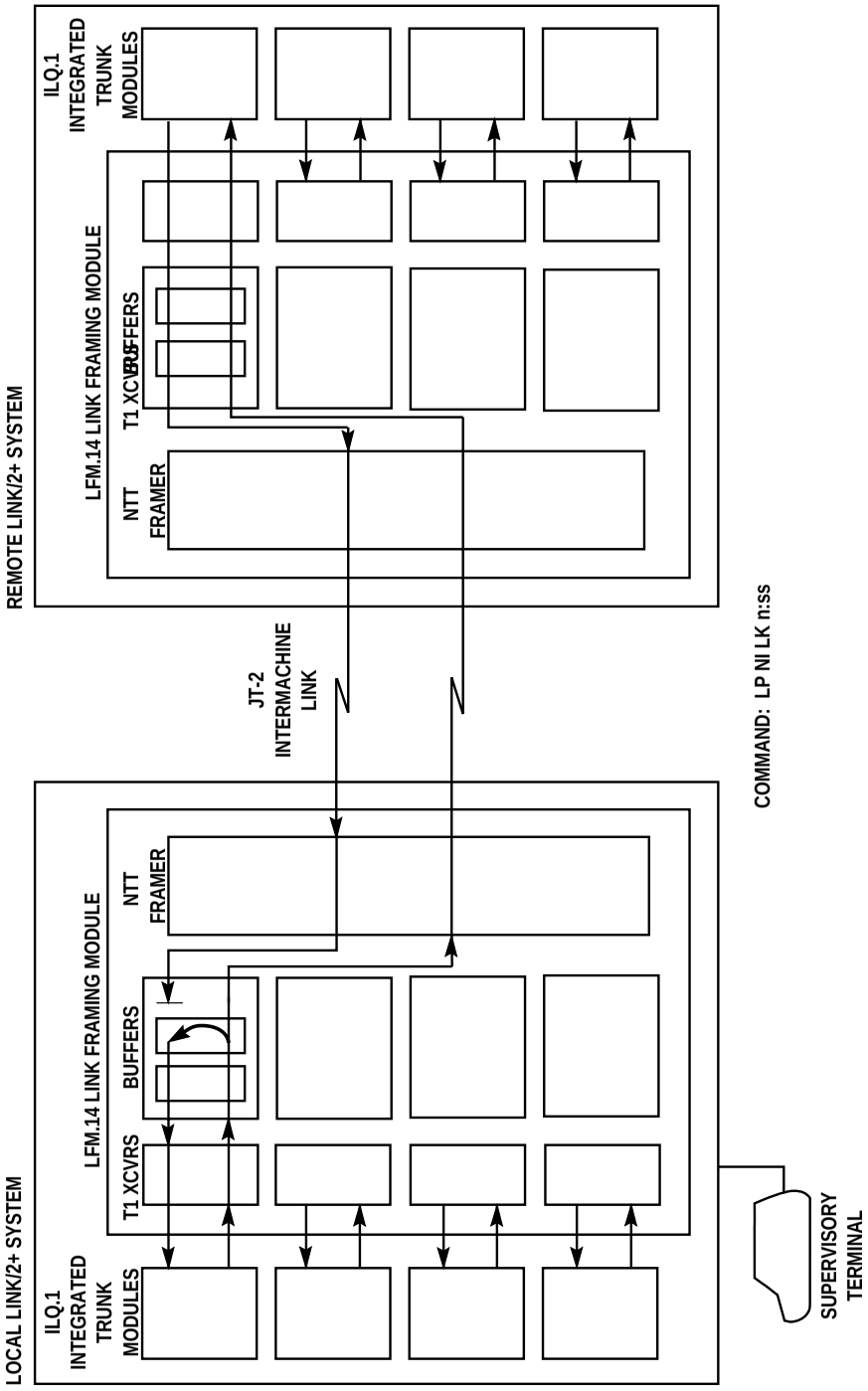


Figure 7-34. Network Interface Loopback for LFM.14 Link Framing Module Low Speed Port (Toward ILQ.1 Integrated Trunk Module)

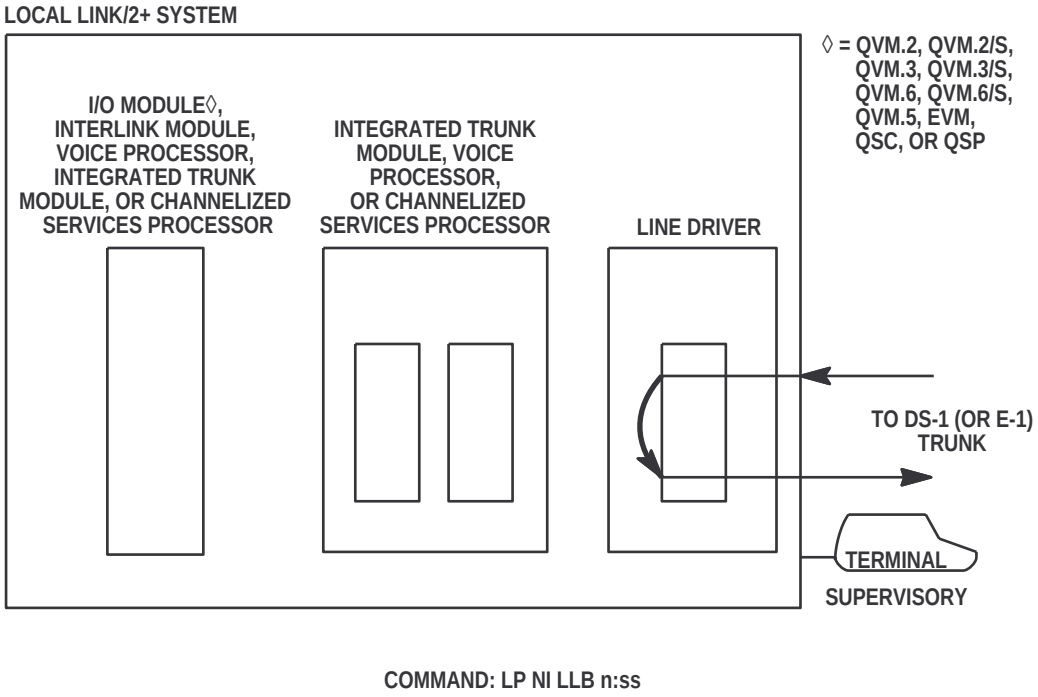

LOCAL LINK/2+ SYSTEM
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP
I/O MODULE◊, INTERLINK MODULE, VOICE PROCESSOR, INTEGRATED TRUNK MODULE, OR CHANNELIZED SERVICES PROCESSOR
INTEGRATED TRUNK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
LINE DRIVER
TO DS-1 (OR E-1) TRUNK
TERMINAL SUPERVISORY
COMMAND: LP NI LLB n:ss

Figure 7-35. Network Interface Loopback Toward DS-1 Trunk

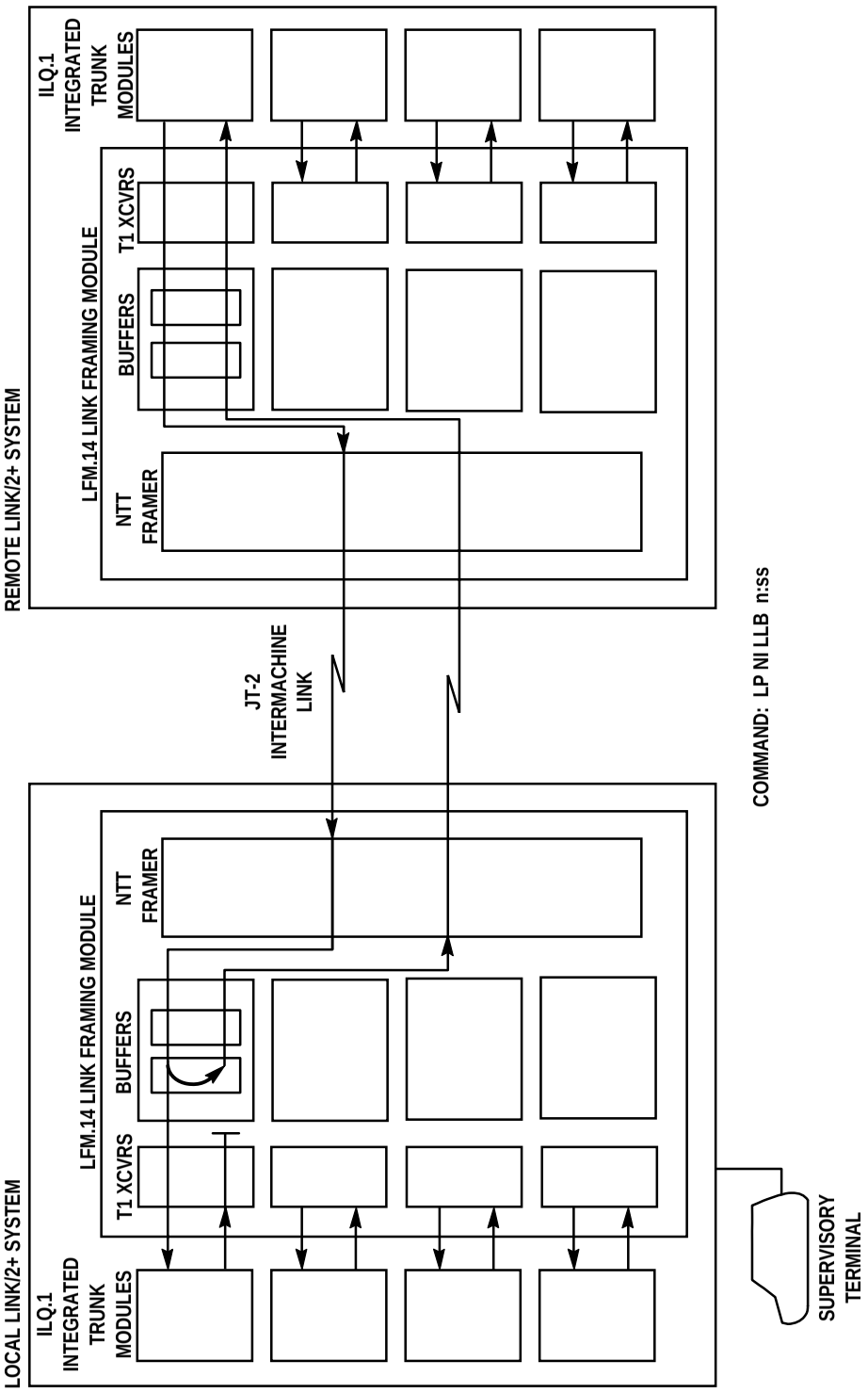


Figure 7-36. Network Interface Loopback for LFM.14 Link Framing Module Low Speed Port (Toward JT-2 Trunk)

Loop X.50 Server Module Subrate Channel (LP XCH) Command

The LP XCH command directs the designated subrate channel(s) phasor data on the specified X.50 Server Module back towards the low speed side, and the subrate channel(s) processed phasor data back toward the associated X.50 DS-0 channel, Figure 7-37. All other subrate channels supported by that X.50 DS-0 channel are unaffected.

The CLR XCH command clears the specified subrate channel(s)from loopback, restoring the channel(s) to normal operation.

Commands:

[NOD xxxx] LP XCH **{**n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}[{**/mmm *or* /P**}]**

where: /mmm = number of minutes (1-240) after which busy out is cleared automatically (default is 2 minutes)
/P = permanent; busy out will not be cleared automatically

[NOD xxxx] CLR XCH **{**n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}**

Loop X.50 Server Module X.50 DS-0 Channel (LP XS0) Command

The LP XS0 command places the specified X.50 DS-0 channel(s) in bidirectional loopback. The aggregate data is looped toward the X.50 network at the phasor and all of the subrate channels supported by the X.50 DS-0 channel(s) are looped towards the low speed outputs, Figure 7-38. All other X.50 DS-0 channels supported by that X.50 Server Module are unaffected.

The CLR XS0 command clears the specified aggregate channel(s)from loopback, restoring the channel(s) to normal operation.

Commands:

[NOD xxxx] LP XS0 **{**n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}[{**/mmm *or* /P**}]**

where: /mmm = number of minutes (1-240) after which busy out is cleared automatically (default is 2 minutes)
/P = permanent; busy out will not be cleared automatically

[NOD xxxx] CLR XS0 **{**n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

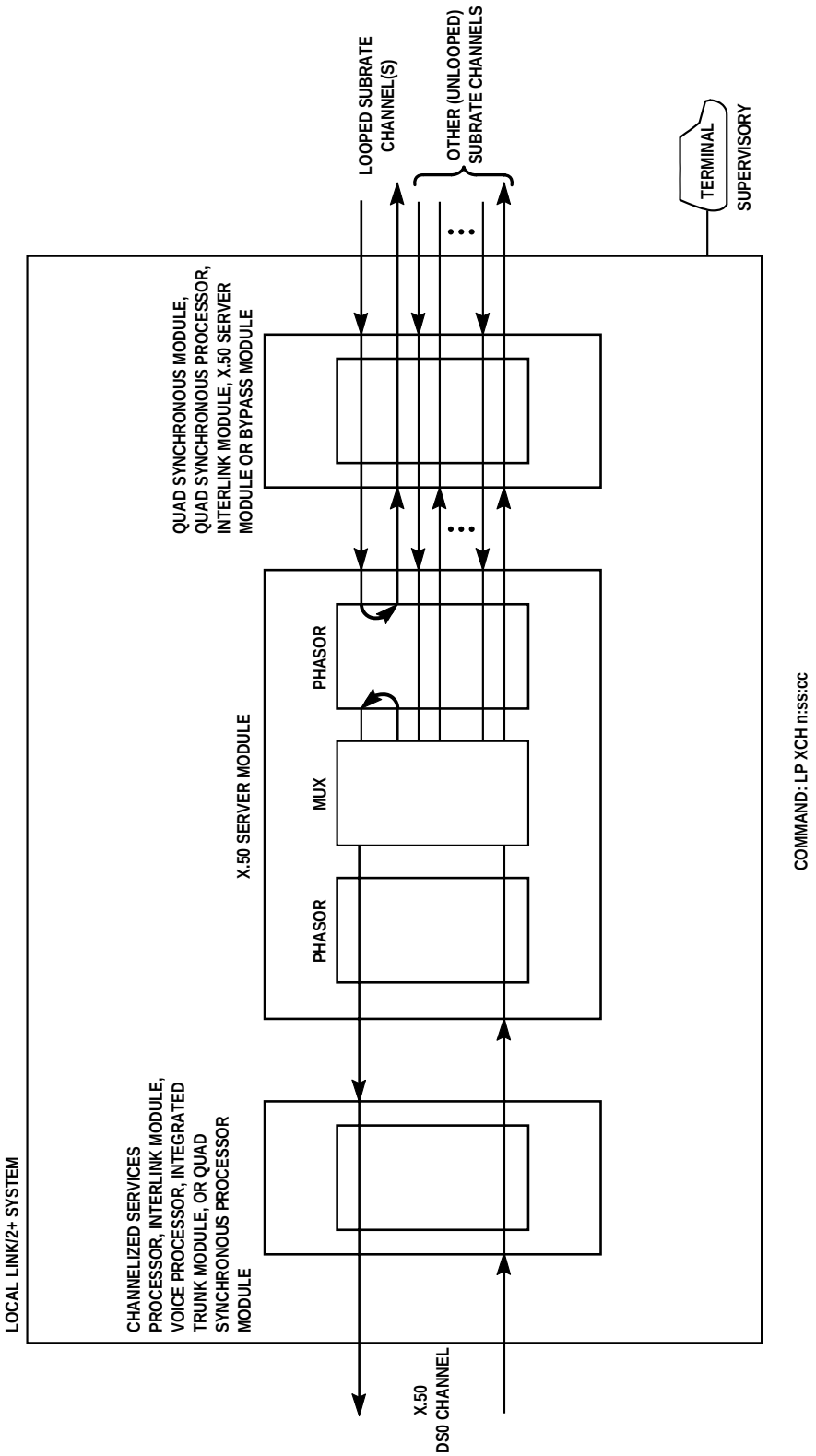

LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTERLINK MODULE, VOICE PROCESSOR, INTEGRATED TRUNK MODULE, OR QUAD SYNCHRONOUS PROCESSOR MODULE
X.50 SERVER MODULE
PHASOR
MUX
PHASOR
QUAD SYNCHRONOUS MODULE, QUAD SYNCHRONOUS PROCESSOR, INTERLINK MODULE, X.50 SERVER MODULE OR BYPASS MODULE
LOOPED SUBRATE CHANNEL(S)
OTHER (UNLOOPED) SUBRATE CHANNELS
TERMINAL SUPERVISORY
COMMAND: LP XCH n:ss:cc
X.50 DS0 CHANNEL

Figure 7-37. X.50 Subrate Channel Bidirectional Loopback

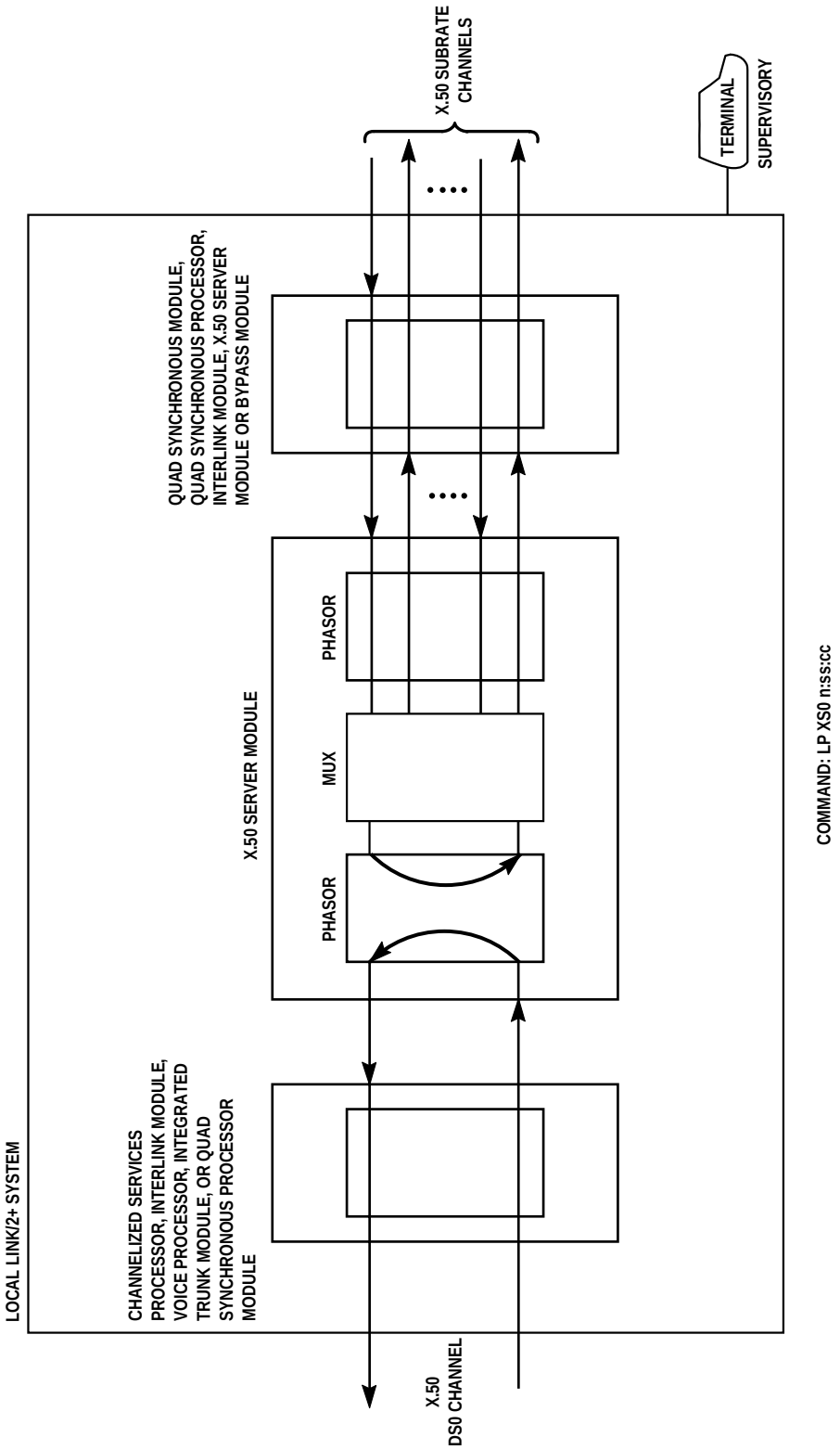

X.50 SUBRATE CHANNELS
TERMINAL SUPERVISORY
QUAD SYNCHRONOUS MODULE, QUAD SYNCHRONOUS PROCESSOR, INTERLINK MODULE, X.50 SERVER MODULE OR BYPASS MODULE
X.50 SERVER MODULE
PHASOR
MUX
PHASOR
COMMAND: LP XS0 n:s:cc
LOCAL LINK/2+ SYSTEM
CHANNELIZED SERVICES PROCESSOR, INTERLINK MODULE, VOICE PROCESSOR, INTEGRATED TRUNK MODULE, OR QUAD SYNCHRONOUS PROCESSOR MODULE
X.50 DS0 CHANNEL

Figure 7-38. X.50 DS-0 Channel Bidirectional Loopback

Monitor Channel Data (MON) Command

The MON command allows data or analog voice being sent or received by a specified channel to be monitored on another specified unused (not connected) channel.

Monitoring an I/O Channel

For I/O channels, the MON command allows the user to monitor:

- Data or analog voice **sent** from an active I/O module channel to an Interlink Module, Integrated Trunk Module, or Voice Processor (MON L)
- Data or analog voice **received** by an active I/O module channel from an Interlink Module, Integrated Trunk Module, or Voice Processor (MON R)

The I/O channel is monitored on another specified I/O channel that is not currently connected.

Command:

[NOD xxxx] MON **{**L *or* R**}** n_1:ss_1:c_1,n_2:ss_2:c_2

where: L = data **sent** from local channel c_1 to an Interlink Module, Integrated Trunk Module, or Voice Processor is monitored on local channel c_2.
R = data **received** by local channel c_1 from an Interlink Module, Integrated Trunk Module, or Voice Processor is monitored on local channel c_2.

The following I/O channel parameters must be identical for both channels:

- Speed
- Mode of transmitting functions
- Phasor size

The CLR MG command removes the I/O channel from monitor mode.

Monitoring an X.50 DS-0 Channel

For X.50 DS-0 channels, the MON command allows the user to monitor:

- X.50 DS-0 channel data **sent** from an active Quad Synchronous Processor Module or Voice Processor to an X.50 Server Module, Interlink Module, or Integrated Trunk Module (MON L)
- X.50 DS-0 channel data **received** by an active Quad Synchronous Module or Voice Processor from an X.50 Server Module, Interlink Module, or Voice Processor (MON R)

The X.50 DS-0 channel is monitored on another specified X.50 DS-0 channel or I/O channel that is not currently connected.

Command:

[NOD xxxx] MON **{**L *or* R**}** **{**n_1:ss_1:cc_1,n_2:ss_2:cc_2 *or* n_1:ss_1:cc_1,n_2:ss_2:c_2**}**

where: L = data sent from local channel cc_1 is monitored on local channel cc_2.(or c_2)
R = data received by local channel cc_1 is monitored on local channel cc_2.(or c_2)

The following X.50 DS-0 channel parameters must be identical for both channels:

- Speed
- Mode of transmitting functions
- Phasor size

The CLR MG command removes the X.50 DS-0 channel from monitor mode.

Monitoring an X.50 Subrate Channel

For X.50 subrate channels, the MON command allows the user to monitor:

- X.50 subrate channel data **sent** from an active Quad Synchronous Processor Module or Quad Synchronous Module to an X.50 Server Module, Interlink Module, or Integrated Trunk Module (MON L)
- X.50 subrate channel data **received** by an active Quad Synchronous Processor Module or Quad Synchronous Module from an X.50 Server Module, Interlink Module, or Integrated Trunk Module (MON R)

The X.50 subrate channel is monitored on another specified X.50 subrate channel or I/O channel that is not currently connected.

Command:

[NOD xxxx] MON **{**L *or* R**}** **{**n_1:ss_1:cc_1:sr_1,n_2:ss_2:cc_2:sr_2 *or* n_1:ss_1:cc_1:sr_1,n_2:ss_2:c_2**}**

where: L = data sent from local channel sr_1 is monitored on local channel sr_2.(or c_2)
R = data received by local channel sr_1 is monitored on local channel sr_2.(or c_2)

The following channel parameters must be identical for both channels:

- Speed
- Mode of transmitting functions
- Phasor size

The CLR MG command removes the X.50 subrate channel from monitor mode.

NOTE: *Isochronous Communication Module channels can only be monitored by other Isochronous Communication Module channels. The channel that is monitoring must be a terminator. If an Isochronous Communication Module is monitoring a channel using FD (frequency discrimination), only the connected speed when the MON command is issued will be monitored.*

Reset Module (RST) Command

The RST command resets the modules in the specified slots or ranges of slots. The following modules can be reset with the RST command:

- Network Module
- Interlink Module
- Voice Processor
- Channelized Services Processor
- Integrated Trunk Module
- D-Channel Module
- Bypass Module
- Voice Server Module
- X.50 Server Module
- Quad Asynchronous Module
- Dual Isochronous Module
- Quad Synchronous Processor
- Foreign Exchange Office Module
- Foreign Exchange Station Module
- Isochronous Communication Module
- Enhanced Voice Module
- Programmable Link Framing Modules (Models LFM.3, .10, .11, .12, .14)

Command:

[NOD xxxx] RST n:ss[-n:ss]...**[**,n:ss[-n:ss]**]**

NOTE: *After issuing a remote RST command to an online Network Module, online Integrated Trunk Module, or online Interlink Module, enter a Control C character to display the supervisory port prompt.*

Resetting a module initiates a hardware and firmware self-test (hardware only on Quad Synchronous Processor) and reinitializes the module. Use the DSP ERR command to display self-test results.

In addition to the self-test:

- Reset to an online Network Module:
  - All modules in the LINK/2+ System are reset.
  - If online Network Module is part of a redundant pair, the offline Network Module becomes the online Network Module, unless an error is detected in the offline Network Module.
- Reset to an offline Network Module of a redundant pair:
  - Offline Network Module performs self-test.
  - Parameters from the online Network Module are loaded into the database of the offline Network Module.
- Reset to an online Interlink Module in a nonredundant configuration causes intermachine link parameters to be loaded.
- Reset to an online Interlink Module of a redundant pair:
  - Offline Interlink Module is switched online.
  - Original online Interlink Module performs self-test.
  - If both Interlink Modules are connected to a Digital Termination Module, both the Interlink Module and the associated driver unit on the Digital Termination Module are switched as a pair.
- Reset to an online Voice Processor in a nonredundant configuration loads all DS-1 (or E-1) and DS-0 parameters.
- Reset to an online Voice Processor of a redundant pair:
  - Offline Voice Processor loads all DS-1 (or E-1) and DS-0 parameters and is switched online.
  - Original online Voice Processor is switched offline and performs self-test.
  - If the Voice Processors are connected to Bipolar Interface Modules or Digital Termination Units, each Voice Processor and its associated Bipolar Interface Module or Digital Termination Unit are switched in unison.
- Reset to an offline Voice Processor of a redundant pair downloads all DS-1 (or E-1) and DS-0 parameters from the online Voice Processor and performs a self-test.

- Reset to a Channelized Services Processor operates the same as reset to a Voice Processor.
- Reset to an Integrated Trunk Module operates the same as reset to a Voice Processor:
  - All proprietary bundles are reinitialized.
  - Dial-up connections must be manually reestablished.
- Reset to an online Bypass Module:
  - Channel connections in Bypass Module are cleared, and Network Module reestablishes all bypass channel connections that existed prior to the reset.
  - If online Bypass Module is part of a redundant pair, the offline module becomes the online module. The Network Module reestablishes all bypass channel connections that existed prior to the reset.
- Reset to an offline Bypass Module causes a self-test of the offline Bypass Module.
- Reset to a primary X.50 Server Module that is currently online causes the next available redundant X.50 Server Module that is in the next highest numbered slot to take over.

NOTE: *A primary X.50 Server Module in the Control Mainframe requires the supporting redundant X.50 Server Module(s) be located in the Control Mainframe as well.*

During this switch over, the X.50 channels and X.50 subrate channels remain fully connected. If there is no redundant X.50 Server Module available, the primary module will disconnect the channels, perform a self-test and then (if the self-test is successful) reconnect the channels.

- Reset to a redundant X.50 Server Module that is currently online causes the original primary module to take over providing the primary module has recovered from its failure state. Otherwise, the next available redundant module will take over.
- Reset to a redundant X.50 Server Module that is currently offline causes the module to perform a self-test and then return to the redundant offline state.
- Reset to a Quad Synchronous Processor reinitializes module hardware and updates channel parameters.

Reset Bundle (RST BDL) Command

The RST BDL command causes a disconnect and then a reconnect on the specified Integrated Trunk Module bundle. When the command is issued to a proprietary bundle, all channels in the bundle are disconnected and may be assigned to alternate routes. In addition, ARQ/BER testing is restarted, and Alarms 6 and 7 are generated. If the bundle parameters were changed prior to issuing this command, the new bundle parameters take effect upon reconnect. If the specified bundle is a dial link type, the bundle realigns after all DS-0s are reconnected.

When issued to a nonproprietary bundle, the command disconnects all DS-0s in the bundle, causing an out-of-service condition and possibly a signal disruption, and then attempts to

reconnect all DS-0s if bandwidth is available. If the bundle parameters were changed prior to issuing this command, the new bundle parameters take effect upon reconnect.

Command:

[NOD xxxx] RST BDL 1:ss:cc

For example, to reset a bundle with master DS-0 2 originating at node 61 on the Integrated Trunk Module in slot 12, enter:

NOD 61 RST BDL 1:12:2

Reset V-Channel (RST CH) Command

The RST CH command resets the specified V-channel (s) on a Voice Server Module without affecting the channel connections. The optional /B qualifier allows the user to block out one or more V-channels, making them unavailable. Channels that are blocked out will be skipped by the Network Module when the Voice Server Module channels are scanned for possible connections. When the DSP ST VCH command is issued, the blocked channels will show a BUSY status.

Re-issuing the RST CH command, without the /B modifier, to the same V-channel (s) unblocks the channel (s) and allows them to again be scanned by the Network Module.

Command:

[NOD xxxx] RST CH n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]**[/B]

For example, to block out V-channels 6 through 10 on the Voice Server Module in slot 12 of the Control Mainframe, enter:

RST CH 1:12:6-1:12:10/B

To unblock those same V-channels from the blocked state, enter:

RST CH 1:12:6-1:12:10

Reset Driver Module (RST DR) Command

The RST DR command permits the user to transfer redundancy between driver 1 circuits and driver 2 circuits on the Driver Module, regardless of the error status.

Command:

[NOD xxxx] RST DR n

PRECAUTION: ***Transfers on active modules may cause momentary disruption of channel data traffic.***

Reset Power Supply Module (RST PS) Command

The RST PS command is used to:

- Determine if a faulty Power Supply Module exists in a redundant pair associated with a specific Mainframe.
- Determine which Power Supply Module of the pair is faulty.

Command:

[NOD xxxx] RST PS n

NOTE: *This command does not apply to part number AW00642-1 Power Supply Modules.*

Under normal operating conditions, redundant Power Supply Modules in a LINK/2+ System share the power load. After issuing this command, the LINK/2+ System tests the operation of an individual Power Supply Module by drawing power for 2 minutes from only one power supply. The Power Supply Module under test is identified by a lit ON LINE indicator.

A faulty Power Supply Module can be isolated as follows:

1. Enter a CLR AQ command to clear the alarm table.
2. Enter the RST PS n command to test one Power Supply Module. ON and ON LINE indicators light on Power Supply Module now in use. ON indicator lights on Power Supply Module NOT in use.
3. If alarm 04 is not displayed within approximately 2 minutes, the Power Supply Module under test is operational.

Set Database Checksum (SET CKS) Command

The SET CKS command calculates and stores a new database checksum on the online Network Module. The checksum is updated each time the database is changed, that is, a parameter change. The checksum computed by the SET CKS command is a **total recalculation** of the checksum. The checksum is used to detect any corruption of the database.

Command:

[NOD xxxx] SET CKS

The database checksum is tested whenever the LINK/2+ System is turned on or the online Network Module is reset. During a checksum test, the checksum is calculated again and compared to the previously stored checksum value. If the values do not agree, the LINK/2+ System reports a database checksum error. In general, a checksum error indicates either a hardware failure or a change in the database by an electrical transient. Use the DSP CKS command to determine if a checksum error exists.

If a database checksum error is reported, enter the SET CKS command. Determine the error that needs to be corrected by checking the database, and make the appropriate changes to the database. The SET CKS command recalculates the checksum but does not correct the error.

NOTE: *If the database has been previously backed up using the SAV DB command, the database should then be restored using the procedure described in Appendix C of the Installation and Maintenance Manual.*

The value determined by the SET CKS command is stored in memory, and the value calculated in all subsequent checksum tests will be compared to the stored value.

Set and Clear Alarm Relay (SET RLY, CLR RLY) Commands

A test of the major and minor alarm relays is conducted using the SET RLY and CLR RLY commands. The SET RLY command causes the contacts of the major and minor alarm relays on the Network Module to close (alarm condition). The CLR RLY command causes the alarm relay contacts to open, restoring the relays to their normal operating condition.

Commands:

[NOD xxxx] SET RLY
[NOD xxxx] CLR RLY

When the alarm relay contacts are closed, either by the SET RLY command or because of a real alarm, these contact closures are presented to the user via the supervisory port connector. Also, a control signal conforming to RS-423 is provided at the Control Mainframe rear panel connector 1D, where:

+6V = relay test activated
-6V = relay test not activated

See the LINK/2+ Installation and Maintenance Manual for cabling information.

A major alarm occurs whenever:

- A clock (phase locked loop) failure occurs (alarm 5).
- ALL intermachine links at a node are declared out-of-service (alarm 7).
- A Bypass Module fails (no redundancy) or both Bypass Modules fail (redundancy) (alarm 13).
- Both circuits on a Driver Module fail (alarm 14).
- ALL intermachine links are down as a result of a LINK/CSU failure (alarm 16).
- The active master clocking node’s clock source is its internal oscillator (alarm 23).

A minor alarm occurs when the LINK/2+ System is still operational but some failure or error condition exists. Minor alarms are generated by alarms 2, 3, 4, 8, 9, 10, 11, 12, 15, 21, 22, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, and 35. In addition:

- Alarm 7 is minor when one or more Interlink Modules or Integrated Trunk Module proprietary bundles are out-of-service.
- Alarm 13 is minor when one Bypass Module of a redundant pair fails. If both Bypass Modules fail at a node, alarm 13 is major.
- Alarm 14 is minor if one circuit of a Driver Module fails. If both circuits of a Driver Module fail, alarm 14 is major.
- Alarm 16 is minor if one or more intermachine links are down as a result of a LINK/CSU alarm. If ALL intermachine links are down, alarm 16 is major.

Set and Clear Tone Generator (SET TON, CLR TON) Commands

The SET TON command initiates a milliwatt reference equivalent test tone on a specified noncontending DS-0 channel. When used with DS-0 channel loopback commands, the SET TON command allows a DS-0 channel to be tested with a known reference signal. The CLR TON command stops the test tone generator on specified DS-0 channel(s).

If the test tone is used with DS-0 contention channels, these channels should be defined as noncontention channels before applying the test tone.

Commands:

[NOD xxxx] SET TON **{**EQ *or* LI**}** n:ss:cc **[{**/mmm *or* /P**}]**

where:
- EQ = tone directed toward the DS-1 (or E-1) trunk, that is, toward the external equipment
- LI = tone directed away from the DS-1 (or E-1) trunk toward an Interlink Module, I/O module, Voice Processor, or Channelized Services Processor, that is, toward the LINK network
- /mmm = number of minutes (1-240) after which test tone is cleared automatically (default is 2 minutes)
- /P = permanent; test tone will not be cleared automatically

[NOD xxxx] CLR TON **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

NOTE: *To test more than one DS-0 channel on a Voice Processor or Channelized Services Processor at the same time, the test tones must all be set toward the same direction. If a test tone is set in the opposite direction, that command will be rejected.*

Test tones can only be used on Channelized Services Processors with a bundle size of 1.

Equipment Test

The test tone begins at the internal tone generator on the specified Voice Processor or Channelized Services Processor and flows toward the DS-1 (or E-1) trunk via the DS-1 (or E-1) interface, Figure 7-39.

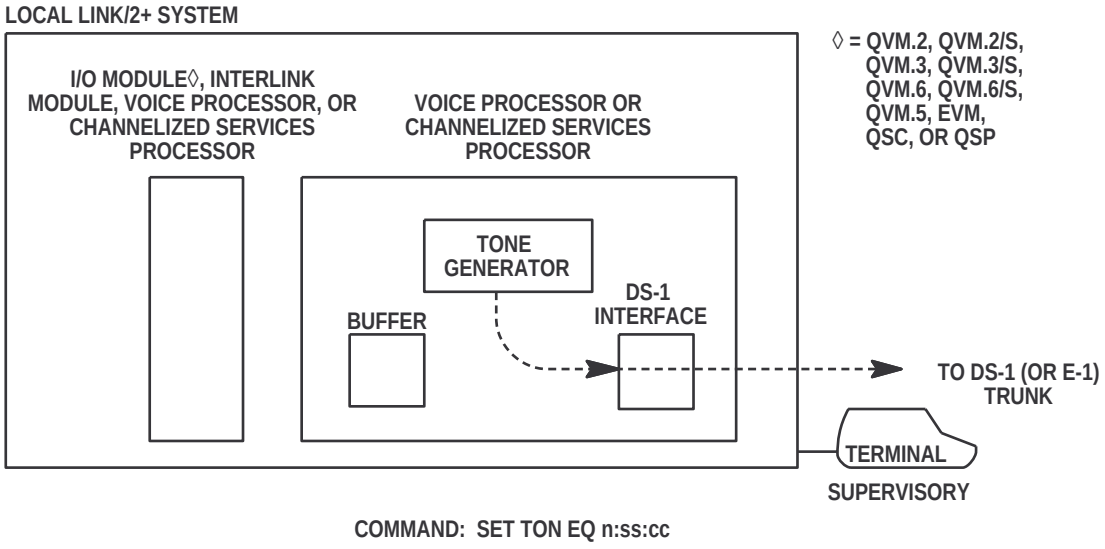

LOCAL LINK/2+ SYSTEM
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP
I/O MODULE◊, INTERLINK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
VOICE PROCESSOR OR CHANNELIZED SERVICES PROCESSOR
TONE GENERATOR
DS-1 INTERFACE
BUFFER
TO DS-1 (OR E-1) TRUNK
TERMINAL
SUPERVISORY
COMMAND: SET TON EQ n:ss:cc

Figure 7-39. Set Tone Equipment Test

Link Interface Test

The test tone begins at the internal tone generator on the specified Voice Processor or Channelized Services Processor and flows toward another module (that is, Interlink Module, I/O module, Voice Processor, or Channelized Services Processor) via the DS-0 channel phasor, Figure 7-40.

Trace Bypass (TRC BP) Command

The TRC BP command is directed to a bypass node to display the bypass status for the specified channel(s).

If you know the channel number(s), one of the following commands is used.

Commands:

[NOD xxxx] TRC BP Nxxxx *
[NOD xxxx] TRC BP Nxxxx **{**n:ss:c[-n:ss:c]...**[**,n:ss:c[-n:ss:c]**]}**[/F]
[NOD xxxx] TRC BP Nxxxx **{**n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**[/F]
[NOD xxxx] TRC BP Nxxxx **{**n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}**[/F]

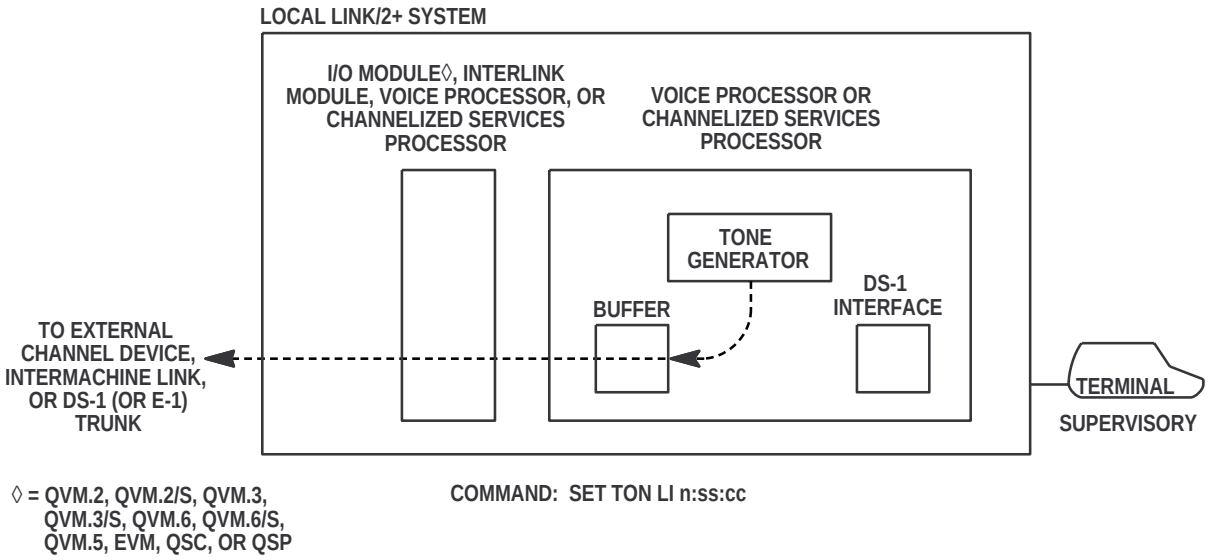

LOCAL LINK/2+ SYSTEM
I/O MODULE◊, INTERLINK MODULE, VOICE PROCESSOR, OR CHANNELIZED SERVICES PROCESSOR
VOICE PROCESSOR OR CHANNELIZED SERVICES PROCESSOR
TONE GENERATOR
DS-1 INTERFACE
BUFFER
TO EXTERNAL CHANNEL DEVICE, INTERMACHINE LINK, OR DS-1 (OR E-1) TRUNK
TERMINAL
SUPERVISORY
◊ = QVM.2, QVM.2/S, QVM.3, QVM.3/S, QVM.6, QVM.6/S, QVM.5, EVM, QSC, OR QSP
COMMAND: SET TON LI n:ss:cc

Figure 7-40. Set Tone Link Interface Test

where:

*	=	all originating or terminating channels
n:ss:c	=	an originating or terminating I/O channel
n:ss:cc	=	an originating or terminating DS-0 or X.50 DS-0 channel
n:ss:cc:sr	=	an originating or terminating X.50 subrate channel
Nxxxx	=	originating or terminating node number
/F	=	optional modifier that causes the list of nodes that the channel traverses (including the originator and terminator nodes) to be displayed

This command can also be entered as:

[NOD xxxx] TRC BP **{*** or n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**/Nxxxx[/F]

where:

/Nxxxx	=	originating or terminating node number

Each channel displayed represents a full duplex channel consisting of the originator connection and the termination connection. See Figure 7-41A for a typical display of an I/O, DS-0, or X.50 DS-0 channel. See Figure 7-41B for a typical display of an X.50 subrate channel.

To display the bypass status for channels inbound or outbound on a specific intermachine link at a bypass node, use the following command.

Command:

[NOD xxxx] TRC BP Nxxxx **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**
{I *or* O**}{**ss *or* ss:cc**}** [/F]

or

For X.50 subrate channels, the command is:

[NOD xxxx] TRC BP Nxxxx **{*** *or* n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}**
{I *or* O**}{**ss *or* ss:cc**}** [/F]

where:

I	=	inbound intermachine link (from originator node)
O	=	outbound intermachine link (toward destination node)
ss	=	slot location of Interlink Module
ss:cc	=	slot location and bundle on Integrated Trunk Module
/F	=	optional modifier that causes the list of nodes that the channel traverses (including originator and terminator nodes) to be displayed

```
N1100>NOD 510 TRC BP 1:17:*/N410
SLOT 1:07          DEST                                  PHASOR    LOOP   CH TYPE  FNS.
CH 043    ORIG:  N0410  CHAN  1:17:01   LINK  9     14        OFF    SYNC     INBAND
          TERM:  N0310  CHAN  2:09:03   ILQ  13:05

CH 044    ORIG:  N0410  CHAN  1:17:02   LINK  9     14        OFF    SYNC     INBAND
          TERM:  N0310  CHAN  2:09:04   LINK 11     14

CH 045    ORIG:  N0410  CHAN  1:17:03   LINK  9     14        OFF    SYNC     INBAND
          TERM:  N0310  CHAN  2:12:01   LINK 11     14 ER

CH 046    ORIG:  N0410  CHAN  1:17:04   LINK  9     14        OFF    SYNC     INBAND
          TERM:  N0310  CHAN  2:12:03   LINK 11*    14
```

SLOT 1:07 - Online Bypass Module at node to which command is directed

CH 043 - Bypass channel number

ORIG: N0410 CHAN 1:17:01- Node number and nest:slot:channel number of originator channel

LINK 9 - Slot location of Interlink Module, Integrated Trunk Module, or Channelized Services Processor that connects towards **Originator** node (* = connection is pending)

PHASOR - Phasor size in bytes of bypass pair phasors (ER = Phasor error has occurred)

LOOP - Loopback status of Bypass Module, where:
OFF = Bypass channel not in loopback
ON = Bypass channel in loopback

CH TYPE - Type of channel being bypassed, where:
ASYNC = Quad Asynchronous Module channel
SYNC = Synchronous, Isochronous, or Voice Module channel

FNS. - Mode of transmitting functions, in-band or out-of-band

TERM: N0310 CHAN 2:09:03 - Node number and nest:slot:channel number of terminator channel

ILQ 13:05 - Slot location of Interlink Module, Integrated Trunk Module, or Channelized Services Processor that connects towards the **Terminator** node

A. DISPLAY USING n:ss:c MODIFIER

Figure 7-41. Typical Trace Bypass Display (TRC BP) (Sheet 1 of 2)

```
N1100>NOD 510 TRC BP 1:15:10:12/N410
SLOT 1:17          DEST                                  PHASOR    LOOP   CH TYPE  FNS.
CH 153    ORIG:  N0410  CHAN  1:15:10:12  LINK  9   14        OFF    SYNC     INBAND
          TERM:  N0310  CHAN  2:09:03:15  LINK  11  14
```

CHAN 1:15:10:12 - Channel number of originator X.50 subrate channel

CHAN 2:09:03:15 Channel number of terminator X.50 subrate channel

B. DISPLAY USING n:ss:cc:sr MODIFIER

```
N0129>TRC BP N150 * I 5/F
SLOT 1:17         DEST                                  PHASOR   LOOP   CH TYPE  FNS.
CH 042     0RIG:  N0150  CHAN  2:01:01  LINK  05    14      OFF    SYNC     INBAND
           TERM:  N0097  CHAN  3:16:03  LINK  09    14

           NODES -> 150 37 10 129 097      GRM ENABLED
```

NODES -> - List of nodes traversed by channel displayed

-GRM ENABLED - Grooming enabled

C. DISPLAY USING I ss MODIFIER

Figure 7-41. Typical Trace Bypass Display (TRC BP) (Sheet 2)

Each channel displayed represents a full duplex channel consisting of the originator connection and the termination connection. An asterisk indicates that a connection is pending, that is, not yet established. See Figure 7-41C for a typical display.

Trace Channel (TRC CH) Command

The TRC CH command, when issued to an originating or terminating node, displays the status of the specified channel connection(s).

Command:

[NOD xxxx] TRC CH **{*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

or

For X.50 subrate channels, the command is:

[NOD xxxx] TRC CH **{*** *or* n:ss:cc:sr[-n:ss:cc:sr]...**[**,n:ss:cc:sr[-n:ss:cc:sr]**]}**

Status is indicated by the following messages:

- CH n:ss:cc Vn:ss:pp Lss -> aaaa bbbb cccc ...nnnn

where:

Vn:ss:pp	=	V-channel address (if applicable)
Lss	=	outbound link number
aaaa	=	originator node
bbbb	=	first bypass node
cccc	=	second bypass node
nnnn	=	terminator node
*	=	indicates the node number in the list where the channel resides

- CH n:ss:cc CON DR PATH a b c...

where:

CON DR	=	direct connection
a, b, c...	=	direct connect path

- CH n:ss:cc NOT CONNECTED
- CH n:ss:cc LOCAL DROP
- CH n:ss:cc CON - TERMINATOR
- CH n:ss:cc PROP BUNDLE

See Figure 7-42 for a typical display.

```
N0006>TRC CH 1:16:1-1:16:8
CH 1:16:01              L04 -> *0006 0020 0030
CH 1:16:02    V1:06:01  L04 -> *0006 0020 0030
CH 1:16:03              L04 -> CON DR PATH: 1
CH 1:16:04              L04 -> *0006 0020
CH 1:16:05    V1:06:02  L04 -> *0006 0025 0035 SPX
CH 1:16:06              L04 -> CON DR PATH: 2
CH 1:16:07              L04 -> 0001 XXXX XXXX 0033*
CH 1:16:08    NOT CONNECTED
```

CH 1:16:01 - Channel number
L04 - Outbound link number
V1:06:01 - V-channel address. An asterisk (*) after the V-channel indicates a pending state. The I/O channel is connected; however, the V-channel is not yet fully connected.
XXXX XXXX - Denotes unknown bypass nodes which are the result of a lost simplex connection request and reinitiation of the request by the receiving node to reestablish the connection.
-> *0006 0020 0030 - Lists originator node, bypass node(s), and terminator node. Asterisk (*) indicates the node number in the list where the channel resides; SPX signifies a simplex link.
CON DR PATH - Direct connect path

Figure 7-42. Typical Trace Channel Display (TRC CH)

Test DS-0 Channel (TST DS0) Command

The TST DS0 command causes a milliwatt reference equivalent test tone to be transmitted on specified Voice Processor DS-0 channel(s), and detects whether the tone is received back on the opposite side of the associated channel phasor(s). The test result is PASS or FAIL. After the TST DS0 command is entered, the supervisory port displays the DS-0 channel test results, Figure 7-43.

Command:

[NOD xxxx] TST DS0 **{**EQ *or* LI**} {*** *or* n:ss:cc[-n:ss:cc]...**[**,n:ss:cc[-n:ss:cc]**]}**

where: EQ = channel phasor loopback toward the DS-1 (or E-1) trunk, that is, toward the external equipment
LI = channel phasor loopback toward an Interlink Module, I/O module, or Voice Processor via the system bus, that is, toward the LINK network.

```
N0028> TST DSO EQ 1:2:11-1:2:14

     1:02:11    PASS    1:02:12    FAIL    1:02:13    PASS    1:02:14    PASS
```

Test results for each selected channel are displayed:

1:02:11 - DS-0 channel being tested

PASS - Test results, where:
PASS = Test tone is received
FAIL = Test tone not received

Figure 7-43. Typical Test DS-0 Channel (TST DS0) Command

The following conditions and results apply when the TST DS0 command is issued:

- The DS-0 channel must be connected.
- The TST DS0 command can only be executed on channels that are not compressed. Attempts to issue a test on ADPCM channels will be rejected, and the message "ILLEGAL" is displayed at the supervisory terminal.
- If a test tone is not already activated on the DS-0 channel, the Voice Processor will issue a test tone, and then will remove it when the test is finished.
- If a test tone is already activated on the DS-0 channel, but the tone is in the opposite direction, or if other DS-0 channels have tones in place in the opposite direction, the command will be rejected.
- The test command requires that a digital loopback be activated somewhere on the channel to be tested. If no loopback exists, or if the loopback is analog, the test will report FAIL.
- The TST DS0 command cannot be issued from the supervisory terminal if the command has already been issued from a supervisory computer. Otherwise, the message "IN PROG" is displayed at the supervisory terminal.

- The TST DS0 command should not be used with contention DS-0 channels. To test contention DS-0 channels, the channels should be defined for noncontention before proceeding.

Test Generator and Clear Test Generator (TST, CLR MG) Commands

A complete or partial test of data, analog voice, or EIA control functions is established by the TST command. To loop the test path from the internal test generator to the internal test detector, test generator commands are used with loopback commands. The CLR MG command stops and clears the test generator for partial tests 1 and 2. This command also removes an I/O channel from monitor mode. The CLR MG command should be entered before each loopback test to ensure that the byte counters are cleared.

NOTE: *Do not run test generator at channel rates above 392 kbps.*

Commands:

[NOD xxxx] TST **{**L *or* R**} {**DAT *or* CNT**} {**C *or* P1 *or* P2**}** n:ss:c

For X.50 Server Module, the commands are:

[NOD xxxx] TST **{**L *or* R**} {**DAT *or* CNT**} {**C *or* P1 *or* P2**}** n:ss:cc

or

[NOD xxxx] TST **{**L *or* R**} {**DAT *or* CNT**} {**C *or* P1 *or* P2**}** n:ss:cc:sr

where:
- L = local test
- R = remote test
- CNT = conducts a test of EIA control functions on channel n:ss:c
- DAT = conducts a test of data or analog voice on channel n:ss:c
- C = complete test
- P1 = partial test 1; constant data bit pattern, or EIA control functions in off condition
- P2 = partial test 2; constant data bit pattern that is different from the P1 bit pattern, or EIA control functions in on condition
- n:ss:c = I/O channel
- n:ss:cc = X.50 DS-0 channel
- n:ss:cc:sr = X.50 subrate channel

[NOD xxxx] CLR MG

NOTE: *When using TST command with FXS/FXO Modules, put channel into loopback using LP LD CH command.*

Local Test

The test signal begins locally at the internal test generator, flows through the local I/O module channel being tested, is looped by a selected I/O module channel loopback command, and returns to the local test detector. See Figure 7-44A for an example.

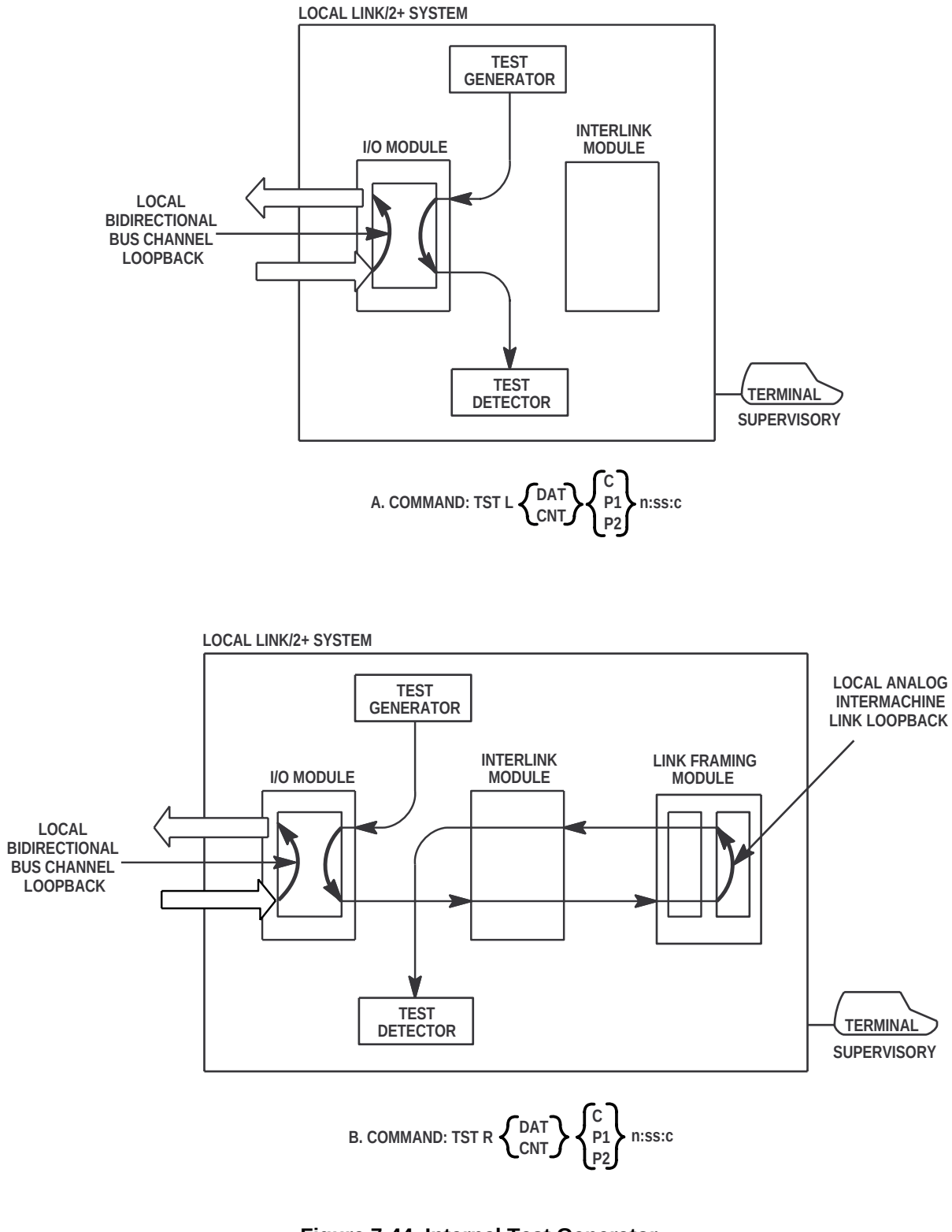


Figure 7-44. Internal Test Generator

Remote Test

The test begins locally at the internal test generator, is looped by a selected I/O module channel loopback command, and flows through an Interlink Module across the intermachine link or through a Voice Processor until the flow is looped again. The test signal then returns to the local test detector. See Figure 7-44B for an example.

EIA Control Functions Tests

The complete (CNT C) EIA control functions test checks EIA functions both in ON and OFF status. The complete test results are automatically displayed on the supervisory terminal.

Partial test 1 (CNT P1) checks only EIA control functions in the OFF condition. Partial test 2 (CNT P2) checks EIA control functions in the ON condition. The results of the partial tests are displayed using the DSP TST command.

Data Flow Tests

The complete (DAT C) data test checks two alternate data bit patterns. The test results for the complete test are automatically displayed on the supervisory terminal.

Partial test 1 (DAT P1) checks a constant data bit pattern. Partial test 2 (DAT P2) checks a constant data bit pattern that is different from the P1 bit pattern. The results of the partial tests are displayed using the DSP TST command.

NOTE: *The test generator commands (TST) cannot be used with Subrate Channel Processor channels. Channel loopbacks on a Subrate Channel Processor are controlled by manual switches on the module. End-to-end testing of subrate channels is the responsibility of the Central Office terminating these channels. See Troubleshooting chapter in LINK/2+ Installation and Maintenance Manual for information on Subrate Channel Processor testing.*

Regulatory Requirements

This section contains regulatory information for countries that require specific text to appear in the manual documentation. This equipment has been approved for use in many countries other than those listed in this section. For countries not listed below, regulatory requirements and approvals information can be obtained from your local Ascom Timeplex office.

The information in this section includes mandatory or recommended requirements of certification authorities for the following areas.

Included are requirements for:

- Canada
- Europe
- Switzerland
- United Kingdom
- United States

NOTE: *All ports on this equipment are Safe Extra Low Voltage (SELV) unless otherwise noted and should only be connected to SELV ports on other equipment.*

Canada

Telephone Line Connection Information

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: ***Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.***

Load Number

The **Load Number** (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100. An alphabetic suffix is also specified in the Load Number for the appropriate ringing type (A or B), if applicable. For example, LN = 20A designates a Load Number of 20 and an "A" type ringer.

Canadian Compliance Statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émat pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Réglement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Europe

General Pan-European Requirements

With the harmonization of Telecommunications in Europe, the connection of Terminal Equipment to the Public Telecommunications Networks, is regulated by Directives issued by the European Commission. Public Telecommunication Network Services provided to Terminal Equipment users may be supplied as a National Service, with interface standards specific to the country in which it is provided, or as a Pan-European Service, with a common interface standard throughout all European countries.

In this section, it is stated which product interfaces are compatible with the National and which with the Pan-European standards. In principle, products with the **CE** markings are intended for use in any European country, but in practice products with multiple interfaces require a clearer definition of their compatibility with the public network.

CE Marked Equipment

Certain Ascom Timeplex equipment is marked with one of the following:

CE The equipment, when correctly installed in accordance with the user manual instructions, meets the requirements of the European Electromagnetic and Low Voltage Directives.

CE168X The equipment, when correctly installed in accordance with the user manual instructions, meets the requirements of the European Electromagnetic, Low Voltage, and Telecommunications Terminal Directive, and may be connected to the Public Telecommunications Networks of the European Union Countries.

CE⊛ The equipment, when correctly installed in accordance with the user manual instructions, meets the requirements of the European Electromagnetic, Low Voltage, and Telecommunications Terminal Directive, but cannot be connected to the pan-European Public Telecommunications Networks of the European Union Countries.

CE❒ Where **CE❒** is a National Approval Label that implies the equipment, when correctly installed in accordance with the user manual instructions, meets the requirements of the European Electromagnetic, and Low Voltage Directives, and in addition has been granted Public Network Attachment Approval in those countries whose labels are afixed.

NOTE: *Refer to the country specific sections of this regulatory section to determine the National Attachment Approvals granted to the equipment.*

Ascom Timeplex has endeavored to undertake the mandatory "TYPE APPROVAL TESTING" of Public Network Interfaces on their products to both Pan-European and selected country specific requirements. Certificates and reports permitting the CE marking of the products "Placed On The European Market" and the Public Network Attachment Approval Certificates associated with National Interfaces are held on file by the company. Please contact Ascom Timeplex for further information.

NOTICE

PUBLIC NETWORK ATTACHMENT APPROVAL HAS BEEN GRANTED ON THE BASIS THAT THE EQUIPMENT IS IDENTICAL TO THAT CERTIFIED DURING "TYPE APPROVAL TESTING". USERS MUST ENSURE CONFIGURATION, AND INSTALLATION IS PERFORMED IN ACCORDANCE WITH THE USER MANUAL INSTRUCTIONS, AND USING THE SPECIFIED APPROVED CABLES.

Declaration of Comformity

In association with the CE marking of the product, Ascom Timeplex declares under its sole responsibility that the products known as the MicroLINK/2+, MiniLINK/2+ and LINK/2+ are in conformity with the following Directives and standards. An official copy of the Declaration of Comformity is available upon request.

European Low Voltage Directive	(LVD)	73/ 23/EEC
Telecommunications Terminal Equipment Directive	(TTE)	91/263/EEC
Electromagnetic Compatibility Directive	(EMC)	89/336/EEC
CE Marking Directive	(CEM)	93/ 68/EEC

EN 60950:1992	Safety of information technology equipment, & electrical business equipment
EN41003:1991	Safety of equipment connectected to telecommunications networks
EN 55022:1987	Limits of radio disturbance characteristics of IT equipment, Class A
EN 50082-1	Immunity characterstics: Residential, Commercial, & Light Industry
IEC 801-2: 1984 / 1991	Electrostatic Discharge
IEC 801-3: 1984 / 1992d	Radiated Electromagnetic Field
IEC 801-4: 1988	Electrical Fast Transients / burst requirements
NET.5	ISDN Primary Rate Access
BAPT 223 ZV 25 Clause 3	ISDN German deviations to NET.3 and NET.5
OTR-001	2.048Mb/s G.703 75 Ω Digital Leased Line

Regulatory Guidance

It is considered a criminal offence to install Telecommunications Terminal Equipment which is not approved, or to install it in a non-compliant manner. Advice should be obtained from a competent Engineer BEFORE making Public Network Connections.

European Telecommunications Regulatory legislation is concerned mainly with the following aspects of connection to Public Telecommunications Networks:

1. That all equipment in a Network connected directly or indirectly to a public network is approved, and appropriately marked to show this.

2. That all equipment connected directly to a Public Network is approved for connection to the service concerned.

3. That any equipment connected directly to the Public Network does not present hazardous conditions to the network or place the user at risk from hazards present on the Public Network.

4. That the equipment used as a direct or indirect attachment to the Public Network does not affect the integrity of that Public Network.

5. That networks installed in one country, but linked to international circuits, comply with international agreements.

6. That the equipment, approved for operation under certain conditions, and connected in an acceptable manner to the Public Network, is used in accordance with suitable user installation and operating instructions supplied with the equipment.

Principles of Product Attachment Approval Requirements

The Public Network Attachment Approval of this equipment shall be invalidated in the event of the connection of any apparatus or cabling which does not comply with the following:

1. Digital attachments to PTO Services shall be equipment approved for the purpose in which they are being used.

2. Attachments shall not materially affect the electrical performance characteristics of the interface to the PTO service.

3. All cables and wiring shall be compliant with appropriate codes of practice and relevant standards.

4. Apparatus approved for connection to PTO services must be connected to the Network Termination Point (NTP) using the approved listed cable or an alternate cable meeting the electrical characteristics of the Ascom Timeplex specified cable.

5. National requirements may restrict the carrying or interfacing of speech derived from, or destined for the PSTN.

Safety Information and Warnings

This equipment is only approved for use when operated in the following environment:

- **Temperature Range** 0° to 45°C
- **Humidity** To 95% (noncondensing)
- **Atmospheric Pressure** 13,000 feet (4000 meters)
- **Power Input Range** 100 to 240Va.c., 50/60 Hz

WARNINGS: ELECTROMAGNETIC COMPATIBILITY

THIS EQUIPMENT HAS BEEN CERTIFIED COMPLIANT WITH EN55022 CLASS A ELECTROMAGNETIC EMISSIONS STANDARDS, AND IS SUITABLE FOR USE IN COMMERCIAL AND LIGHT INDUSTRIAL ENVIRONMENTS WHEN INSTALLED IN ACCORDANCE WITH THE USER INSTRUCTIONS.

THIS EQUIPMENT IS NOT APPROVED FOR USE IN PARTICULARLY DAMP ENVIRONMENTS WHERE WATER OR MOISTURE IS PREVALENT.

THIS EQUIPMENT MUST BE CONNECTED TO A PROTECTIVE EARTH IN ACCORDANCE WITH THE INSTRUCTIONS WITHIN THE INSTALLATION AND MAINTENANCE MANUAL. IMPROPER EARTHING MAY RESULT IN AN ELECTRICAL SHOCK HAZARD.

THIS EQUIPMENT DOES NOT PROVIDE SAFETY ISOLATION BETWEEN ITS PORTS. HAZARDOUS CONDITIONS IMPOSED AT A PORT MAY RESULT IN HAZARDOUS CONDITIONS ON OTHER PORTS.

INTERCONNECTION DIRECTLY OR BY WAY OF OTHER APPARATUS OF ANY EQUIPMENT NOT COMPLIANT WITH EN60950/EN41003 TO ANY PORT ON THIS EQUIPMENT MAY PRODUCE HAZARDOUS CONDITIONS ON THE NETWORK AND, THEREFORE, ADVICE SHOULD BE OBTAINED FROM A COMPETENT ENGINEER BEFORE SUCH CONNECTIONS ARE MADE.

Analog Voice Barrier (AVB) Module

To protect the Safe Extra Low Voltage (SELV) circuits of the LINK/2+ System from Telephone Network Voltages (TNV), voice ports must be connected via an AVB Module if the PABX port does not guarantee isolation from TNV circuits. If the PABX port classification is unknown, an AVB Module should be used. Note that AVB Modules should only be used with /B variants of the Voice Modules.

PRECAUTION: ***/B variants MUST NEVER be used without AVB modules.***

European Public Network Interface Cables (Eurocables)

With the advent of Pan-European Public Network Interface Standards, Ascom Timeplex Equipment is approved for connection to European Public Networks using specific cables applicable to the European Marketplace, and required to maintain Safety and Electromagnetic Compatibility (EMC) compliance. These cables form part of the Attachment Approval and should be ordered using their associated Part Numbers.

To maintain full compliance with the Interface specifications, attention is drawn to the maximum and minimum lengths, and baud rates specified on some interfaces. For reliable operation, references are made to CCITT documents which recommend the expected relationship between cable length and baud rate.

Ascom Timeplex has taken into account the following aspects of cable design to ensure compliance with European legislation applicable to equipment used in "Commercial and Light Industrial" environments:

- Impedance/meter
- EMC Earthing practices
- Interface connections
- Immunity to interference
- Capacitance/meter
- Connector type
- Transition rise times
- Emissions characteristics
- Screen coverage/type
- Connector screening
- Balance about earth
- Safety earthing aspects

PRECAUTION: ***Before installing the equipment in other environments, or using alternative cabling, the advise of a competent Engineer should be taken.***

Switzerland

The Ascom Timeplex LINK/2+ products have been assessed by the Swiss PTT Laboratories and granted Attachment Approval from BAKOM, permitting connection to the services listed in Table 1.

Table 1. National Attachment Approvals Granted

PTO Service	Service Description	LINK/2+ Modules	Module Description	Connection Arrangements
E1/2.048 Mbps	2.048 Mbps G.703 unstructured, 120Ω Balanced, Point-to-Point Leased Line	ILC.2/BIM.8 LFM.3/BIM.8 ILP/BIM.8 CSP/BIM.8	Interlink Module with G.703 adapter G.704 Link Framing Module with G.703 adapter G.704/G.703 Structured Interface G.704/G.703 Structured Interface	4 pin " BERG" header or RJ45 connector to wire endst: **Cable Type** = U72 M shielded 4 Core (twisted) × 0.6mm, Aluminium coated polyester foil with 0.6mm drain, Braided with tinned copper wire 85% coverage **Cable Filter Ferrites =** 2 off JETMAN JMLF-130, 3 turns on each at LINK/2+ **Cable Part Number =** Ascom Timeplex EuroCable No. TBD **Cable Length =** Less Than 6dB Total Attenuation **Maximum Baud Rate =** 2.048 Mbps
Swissnet Primary Rate ISDN	Primary Rate ISDN (Compatible with ICTR 4)	DCM.5 ILQ.2 BIM.8	D-Channel Protocol Module G.704 / G.703 Framing Module G.703/2.048Mb/s,120 Ω Interface	4 pin " BERG" header or RJ45 connector to wire ends: **Cable Type =** U72 M shielded 4 Core (twisted) × 0.6mm, Aluminium coated polyester foil with 0.6mm drain, Braided with tinned copper wire 85% coverage **Cable Filter Ferrites =** 2 off JETMAN JMLF-130, 3 turns on each at LINK/2+ **Cable Part Number =** Ascom Timeplex EuroCable No. TBD **Cable Length =** Less Than 6dB Total Attenuation **Maximum Baud Rate =** 2.048 Mbps

Electromagnetic Compatibility

The LINK/2+ products have been certified compliant with EN55022 Class A Radio Frequency Emission requirements. This permits the installation of the product in "Commercial and Light Industrial" environments, when installed in accordance with the Installation Manual instructions, and using the appropriate cables when connecting to the Public Telecommunications Network.

Speech Traffic

The LINK/2+ product is capable of carrying speech traffic between nodes. Swiss regulations permit the carrying of "Private Voice" traffic which may originate and terminate on PABX's, or on equipment not permitting the conveyancing of traffic from a third party.

PSTN speech may only be carried using PCM 64 kbps algorithms and the speech quality must be certified by BAKOM. Ascom Timeplex has not obtained this certificate from BAKOM and therefore only private speech traffic may be conveyed at this time.

Swiss Attachment Approval Numbers

Table 2 lists the approval numbers for Ascom Timeplex LINK/2+ products.

Table 2. Approval Numbers

Product	Approval Number
MicroLINK/2+ System	BAKOM 94.0801.J.N
MiniLINK/2+ System	BAKOM 94.0801.J.N
LINK/2+ System	BAKOM 94.0801.J.N

United Kingdom

National Attachment Approvals

Table 1 lists PTO services for which U.K. national attachment approvals have been granted.

Table 1. National Attachment Approvals Granted

PTO Service	Service Description	LINK/2+ Modules	Module Description	Connection Arrangements
Megastream and equivalentg E1 Services provided by other UK carriers.	2.048 Mbps G.703 unstructured, 75 Ω BNC	ILC.2/BIM.9 ILC.2/DTU.5 LFM.3/BIM.9 DCM.7/ILQ.2/ BIM.9 ILP/BIM.9 CSP/BIM.9	Interlink Module with G.703 adaptor Interlink Module with G.703 presentation G.704 Link Framing Module with G.703 adapter DASS 2 Interface G.704/G.703 structured PABX Interface G.704/G.703 structured PABX Interface	G.703 BNC to G.703 Network Termination Unit: **Cable Type =** Twin RG59 Co-axial **Cable Part Number =** Ascom Timeplex EuroCable No. 41 **Cable Length =** Less Than 6dB Total Attenuation **Maximum Baud Rate =** 2.048 Mbps
Kilostream	Digital X.21/V.11 Point-to-Point Leased Line Up to 64 Kbps	QSC.2 QSP.2	Quad Synchronous Channel Module Quad Synchronous Processor Module	25DM to 15DM Network Termination Unit: **Cable Part Number =** Ascom Timeplex EuroCable No. 9B **Cable Length =** As per CCITT V.11 **Maximum Baud Rate =** 64 Kbps
Kilostream	Digital V.35 Point-to-Point Leased Line Up to 48 Kbps	QSC.4 QSP.4	Quad Synchronous Channel Module Quad Synchronous Processor Module	25DM to 34 pin MRAC Network Termination Unit: **Cable Part Number =** Ascom Timeplex EuroCable No. 25B **Cable Length =** As per CCITT Rec. V.35 **Maximum Baud Rate =** 64 Kbps
Kilostream	Digital X.21/V.11 Point-to-Point Leased Line	ILC.2	Interlink Module	25DM to 15DM Network Termination Unit: **Cable Type** = L1-NTU

Table 1. National Attachment Approvals Granted (Cont'd)

PTO Service	Service Description	LINK/2+ Modules	Module Description	Connection Arrangements
PABX Tie-Line Ports **without** TNV Barrier	4 Wire PABX Tie-Line Ports	QVM.3/B + AVB QVM.6/B + AVB EVM/B + AVB	Quad Voice Module Quad Voice Module Enhanced Voice Module	25DM * 2 to wire ends: **Cable Type =** QVM/4V
PABX Tie-Line Ports **with** a TNV Barrier	4 Wire PABX Tie-Line Ports	QVM.3 QVM.6 EVM	Quad Voice Module Quad Voice Module Enhanced Voice Module	25DM * 2 to wire ends: **Cable Type =** QVM/4V

United Kingdom Attachment Approval Numbers

Table 2 lists the approval numbers for Ascom Timeplex LINK/2+ products.

Table 2. U.K. Attachment Approval Numbers

Product	Approval Number
MicroLINK/2+ System	NS/1025/123/J/453143
MiniLINK/2+ System	NS/1025/123/H/452923
LINK/2+ System	NS/1025/123/H452923
EntréeLink/+ System	NS/1025/12/N/603220

PSTN Speech Traffic

Networks carrying PSTN speech should be designed in conformance with the OFTEL Network Code of Practice using the characteristics specified in the user manual to determine the design of compliant networks. "Round trip delays" through LINK/2+ nodes require complex calculations dependant on the node configuration. Please contact Ascom Timeplex to obtain assistance.

United States

Federal Communication Commission Part-68 Registration Information

WARNING

In accordance with FCC Part 15 Subpart B requirements, changes or modifications made to this equipment not expressly approved by Ascom Timeplex could void the user's authority to operate this equipment.

General Information Regarding the Use of Customer Provided Telephone Equipment

FCC regulations and telephone company procedures prohibit connection of customer-provided equipment to telephone company-provided coin service (central office implemented systems). Connection to party lines service is subject to State tariffs.

The goal of the telephone company is to provide you with the best service it can. In order to do this, it may occasionally be necessary for them to make changes in their equipment, operations, or procedures. If these changes might affect your service or the operation of your equipment, the telephone company will give you notice, in writing, to allow you to make any changes necessary to maintain uninterrupted service.

If you have any questions about your telephone line, such as how many pieces of equipment you can connect to it, the telephone company will provide this information upon request.

In certain circumstances, it may be necessary for the telephone company to request information from you concerning the equipment which you have connected to your telephone line. Upon request of the telephone company, provide the FCC registration number and the ringer equivalence number (REN) of the equipment which is connected to your line; both of these items are listed on the equipment label. The sum of all of the REN's on your telephone lines should be less than five in order to assure proper service from the telephone company. In some cases, a sum of five may not be usable on a given line.

FCC And Telephone Company Procedures And Requirements

In order to connect this system to the network, the local operating company must be provided with the registration number of this equipment, and the proper connections must be ordered.

To order the proper service, provide the telephone company with:

- the quantities and USOC numbers of the required jacks (shown in Tables 1 through 5 below)
- the sequence in which the trunks are to be connected
- the facility interface codes by position; and
- the ringer equivalence number or service code, as applicable, by position.

Table 1

HAC	Trade Name	Model Number	Number of Central Office Ports*	Number of Stations	Number of Generic Ports**	Telephone Types
N/A	Ascom Timeplex	LINK/2	10	N/A	200	N/A
N/A	Ascom Timeplex	miniLINK/2	2	N/A	24	N/A
N/A	Ascom Timeplex	microLINK/2	2	N/A	24	N/A

* = Number of T-1 ports
** = Maximum number of voice or data ports that the system allows

NOTE: Systems do not include ancillary equipment (for example, proprietary telephone sets or consoles).

Table 2

Type of Interface	USOC Jack-Connector	REN/SRV. Code	Facility Interface Code
2-Wire E & M Type I Side B	RJ2EX	9.0F	TL11E
2-Wire E & M Type II Side B	RJ2FX	9.0F	TL12E
4-Wire E & M Type I Side B	RJ2GX	9.0F	TL31E
4-Wire E & M Type II Side B	RJ2HX	9.0F	TL32E
1.544 Mbps digital channel	RJ48C	6.0P	04DU9-B□
1.544 Mbps digital channel	RJ48C	6.0P	04DU9-C■

□ = DS-1 Communication Facility with D4 framing format
■ = DS-1 Communication Facility with extended framing format

Table 3

Regulatory Status	Digital Interfaces	Manufacturers Port Identifier	Service Order Code	USOC Jack-Connector
*	04DU9-B	ILC, ILC.2, DFM, or ILP**	6.0P	RJ48
*	04DU9-C	ILC, ILC.2, DFM, or ILP**	6.0P	RJ48
*	04DU5-24	SCP/LTS	6.0Y	RJ48S RJ48T
*	04DU5-48	SCP/LTS	6.0Y	RJ48S RJ48T
*	04DU5-56	SCP/LTS	6.0Y	RJ48S RJ48T

* = These ports have been previously included under this grant of registration.

** = T-1 and digital interfaces may use either superframe or extended superframe formats, depending on the channel service unit that is used for connection to the network.

Table 4

Regulatory Status	MTS/WATS Interfaces	Manufacturers Port Identifier	Ringer Equivalence Number	USOC Jack-Connector
*	02LS2	FXO	0.4A	RJ11C RJ21X
*	02GS2	FXO	0.4A	RJ11C RJ21X
M	02LS2	FXO.1	0.4A	RJ11C RJ21X
M	02GS2	FXO.1	0.4A	RJ11C RJ21X
M	02LS2	FXO.3	0.4A	RJ11C RJ21X
M	02GS2	FXO.3	0.4A	RJ11C RJ21X

* = These ports have been previously included under this grant of registration.

Table 5

Regulatory Status	Analog Private Line Interfaces	Manufacturers Port Identifier	Service Order Code	USOC Jack-Connector
*	TL11E	QVC, QVM, QVM.2	9.0F	RJ2EX
*	TL12E	QVC, QVM, QVM.2	9.0F	RJ2FX
*	TL31E	QVC, QVM, QVM.2	9.0F	RJ2GX
*	TL32E	QVC, QVM, QVM.2	9.0F	RJ2HX
*	TL11E	QVM.6	9.0F	RJ2EX
*	TL12E	QVM.6	9.0F	RJ2FX
*	TL31E	QVM.6	9.0F	RJ2GX
*	TL32E	QVM.6	9.0F	RJ2HX
*	TL11E	EVM	9.0F	RJ2EX
*	TL12E	EVM	9.0F	RJ2FX
*	TL31E	EVM	9.0F	RJ2GX
*	TL32E	EVM	9.0F	RJ2HX
*	OL13A	FXS	9.0F	RJ21X
*	OL13B	FXS	9.0F	RJ21X
*	OL13C	FXS	9.0F	RJ21X
M	OL13A	FXS.1	9.0F	RJ21X
M	OL13B	FXS.1	9.0F	RJ21X
M	OL13C	FXS.1	9.0F	RJ21X
M	OL13A	FXS.3	9.0F	RJ21X
M	OL13B	FXS.3	9.0F	RJ21X
M	OL13C	FXS.3	9.0F	RJ21X
* = These ports have been previously included under this grant of registration.				

If Problems Arise

If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to the telephone network. The telephone operating company must be notified before removal of equipment connected to 1.544 Mbps digital services. If the telephone company notes a problem, they may temporarily discontinue service. When practical, they will notify you in advance of this disconnection. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC.

In the event repairs are ever needed on this equipment, they should be performed by ASCOM TIMEPLEX, INC. or an authorized representative of ASCOM TIMEPLEX, INC. For information contact:

ASCOM TIMEPLEX, INC.
16255 Bay Vista Drive
Clearwater, Florida 34620
1-800-237-6670

Affidavit for the Connection of
Customer Premises Equipment to 1.544 Mbps and/or
Subrate Digital Services

For work to be performed in the certified territory of _____
(Telco's Name)

State of _____
County of _____

I, _____, _____, _____
(Name) (Business Address) (Telephone Number)

representing _____, a customer located at _____
(Name of Customer)

_____being duly sworn, state:
(Telephone Number)

I have responsibility for the operation and maintenance of the terminal equipment to be connected to _____ 1.544 Mbps and/or _____Subrate digital services. The terminal equipment to be connected complies with Part 68 of the Commissions rules except for the encoded analog content and billing protection specifications. With respect to encoded analog content and billing protection:

☐ I attest that all operations associated with the establishment, maintenance, and adjustment of the digital CPE with respect to encoded analog content and encoded billing information continuously complies with Part 68 of FCC's Rules and Regulations.

☐ The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.

☐ The encoded analog and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s)/maintainer(s) of the digital CPE responsible for the establishment, maintenance, and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully completing one of the following: (Check appropriate one(s)).

___a. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

___b. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode signals; or

___c. An independent training course (e.g., trade school or technical institution) recognized by the manufacturer/ grantee of the equipment used to encode analog signals; or

___d. In lieu of the preceding training requirements, the operator(s)/maintainer(s) is (are) under the control of a supervisor trained in accordance _____with above.
(Circle One)

I agree to provide_____with proper documentation to demonstrate compliance with the
(Telco's Name)
information as provided in the preceding paragraph, if so requested.

_____
(Signature)

_____
(Title)

_____
(Date)

Subscribed and Sworn to before me
this day of , 19

_____
NOTARY PUBLIC

My commission expires:

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